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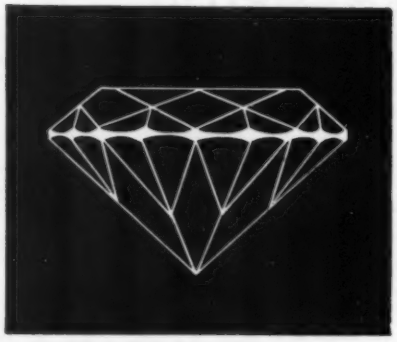

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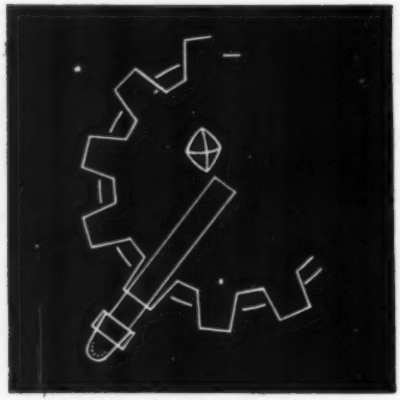

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Generally Speaking

Trade Fairs

Most of the trade fairs this year have been visited by our special correspondents and the main impression has been one of disappointment and regret that so little advantage has been taken of these opportunities to exhibit diamond tools. With the uses of diamond tools constantly increasing in scope and techniques, it seems surprising that these exhibitions, which are such an excellent medium for the passing on of information of this type, should be so sadly neglected. However, there are still the important summer exhibitions to come, in particular at Olympia, Hanover and Milan, and we can only hope that diamond, tool manufacturers will be more in evidence.

The Industrial Diamond Information Bureau will in future be participating in many of these exhibitions whether directly as an exhibitor itself or indirectly by supporting the efforts of the manufacturing companies. Such support will take the form of loan of material for exhibition purposes and the provison of information, pamphlets and other publications.

Prospecting

Although we know that existing resources of diamonds will be sufficient for some years yet, it is reassuring to know that approximately £890,000 is being spent a year in southern and central Africa alone on prospecting for new mineral resources. Although this is not exclusively for diamonds and includes valuable minerals such as gold, copper and uranium, etc., diamonds are, no doubt, amongst the priorities.

ADAMANT

Interferometric Studies on Synthetic Diamonds

by

*S. Tolansky and I. Sunagawa**

Introduction

In an earlier report in this journal (*Industrial Diamond Review* 1960 Vol 20 p 7 (Jan)) we have already described studies made with a sensitive phase-contrast microscope on some of the synthetic diamond material made by the General Electric Co in the United States. We drew attention to the fact that our studies have unambiguously established a number of distinctive differences between natural and synthetic diamond. We have, over a number of years, made numerous studies of the microtopographic characteristics of natural diamonds using microscopic and interferometric methods and this places us in a strong position for making comparisons between the natural and the synthetic products. The first difference we reported concerns cubic faces. We established that amongst the synthetic stones there is quite frequent occurrence of well-formed cubic faces with a remarkable degree of smooth planeness. On the contrary natural cubic faces are notoriously rough and this we have further confirmed by studying a further 300 natural cube faces. Secondly on these synthetic cubic faces striking spiral growths appear, usually one spiral per face. We categorically assert that we have never found the slightest trace of a growth spiral on the several thousand natural faces we have most carefully examined, and re-iterate that our techniques are certainly adequate for revealing even extremely shallow spirals. We have for example shown up spirals on haematite with step height of only 2.3 AU with the same equipment used for the search on the diamonds. A third difference between the synthetic and the natural diamond is the occasional appearance of dendritic crystals amongst the synthetics but not amongst the natural crystals. A fourth difference appears in that there are a very large number of skeletal or hopper type crystals amongst the synthetics, whilst finally the synthetic octahedron faces frequently show up slip lines.

* Royal Holloway College, University of London.

We have extended these initial phase-contrast observations by applying interferometric methods to the study of the synthetic crystals, and since we already have available a very large number of interferograms from the faces of natural diamonds, this makes critical comparison an easy matter. Because the synthetic diamond consists only of minute micro-crystals and because, further, quite a good proportion of the material has rough surfaces, all attempts to apply multiple-beam interferometry have failed and we have therefore contented ourselves with two-beam interferometry. Whilst this is far less powerful than the multiple beam method, it is not to be despised and its use adequately reveals much of interest.

The fringes are produced by the simplest of methods. We used a Vickers projection microscope, employing mostly an 8 mm objective and a x6 eyepiece, together with bellows extension magnification. Strictly parallel monochromatic illumination was required, the green mercury line being employed in much of the work, other wavelengths being used as is usual for correct fringe order allocation. Fringes were produced between the crystals and a glass plate and magnifications from x200 to x800 have been exploited.

Interference between the crystal and the glass plate leads to the formation of Fizeau fringes, which are, of course, a contour map of the surface, the separate adjacent fringe contour lines corresponding each to a height change of 2.73 x 10^{-5} centimetres. In such interferograms one can usually only tell which is up and which is down by the employment of several different monochromatic wavelengths and this we have done.

Cubic faces

We shall consider first the characteristic interferogram shown by a typically well-formed synthetic cubic face. As already mentioned cubic faces are met with much more frequently in synthetic than in natural diamonds. A high

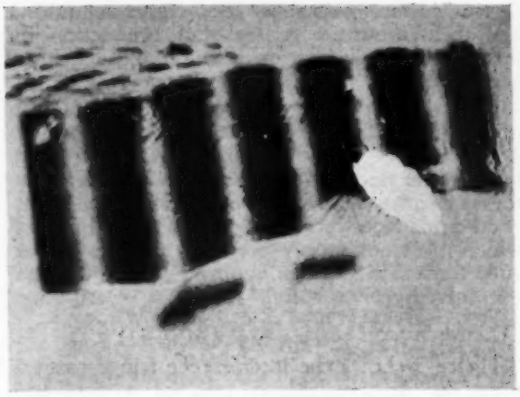


Fig 1. A high magnification interferogram (× 800) of a synthetic cubic face.

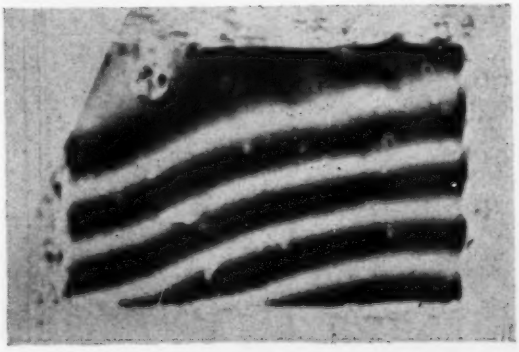
magnification interferogram (x800) is shown in Figure 1. Here we see a small rectangular face which exhibits several notable features, as follows: (1) the regular rectangular outline is clearly evident; (2) the face is covered with a group of very straight, equally-spaced, parallel fringes. That they are so straight, parallel and equidistant is ample proof that the surface is highly smooth and plane, in fact it is a high-grade optical flat, although of course on a small scale. Such an interferogram is then additional unambiguous confirmation of our earlier conclusion based on the phase-contrast microscope observations.

A further point of some very real physical interest concerns the excellent fringe contrast, i.e. the fringe 'visibility.' As we know, the normal reflectivity of good natural diamond approaches 20% Now in producing our interference fringes we are matching two beams, the one from the glass the other from the diamond. Glass has a reflectivity of only 4% so that under normal conditions we are matching two beams which have a 5 : 1 intensity ratio. When two such widely different beams combine to produce interference fringes, such fringes have *low* visibility. With two beams of equal intensity the dark regions are totally black, which can be indicated by saying that the ratio of the intensity of the bright maxima to the dark minima is 1 : 0. However, with two combining beams with intensities one five times that of the other, the fringe pattern which results has a good deal of (unwanted) light in the 'dark' regions. Indeed the computed ratio of the intensity of the bright maxima to the 'dark' minima changes from the favourable 1 : 0 ratio to become instead the ratio 1 : 0.45. The fringe dark regions are thus appreciably diluted with light and thus fringe visibility suffers accordingly.

Yet a glance at Figure 1 shows that the fringe visibility actually obtained is very high. Indeed through the viewing microscope, which is not subjected to the intensity complications arising in photographing and printing, it can be seen that the contrast is so good that actually the reflectivity of the diamond surface must actually be quite close to that of the glass. A diamond reflectivity of the order of 4% is anomalously low. We have not been able to decide yet whether the low reflectivity is due to the surface contamination, or whether in fact the actual bulk reflectivity is low possibly due to bulk inclusion. The synthetic diamonds do have a dirty green colour, despite their very small thicknesses. There is no doubt that they do contain a few per cent of impurity, probably in the form of metal carbide and it is conceivable that this could lead to a reduction in reflectivity. We are not able to improve the position by boiling the diamonds in concentrated nitric acid so that if surface contamination is responsible the surface layer must be chemically resistant. This might happen of course with metal carbide.

Figure 2 shows the interference pattern given by another exceedingly well-formed cubic face on a synthetic diamond. Here too, as in many examples, we have good fringe visibility. We do find in general that there are appreciable variations in fringe visibility in going from crystal to crystal. Indeed at times there is marked variation from different parts of the same face. This would favour the likelihood that we are confronted here with thin variable surface contamination, but the evidence is as yet inconclusive. Important is the fact that some clearly

Fig 2. The Interference pattern given by a well formed cubic face on a synthetic diamond.



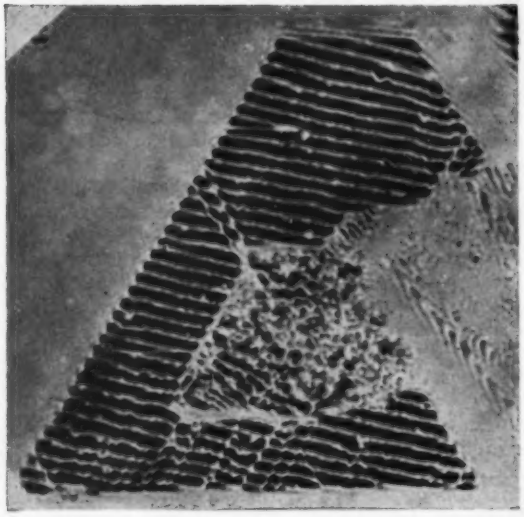


Fig 3 (above). The interference fringe pattern given by a synthetic octahedron face.

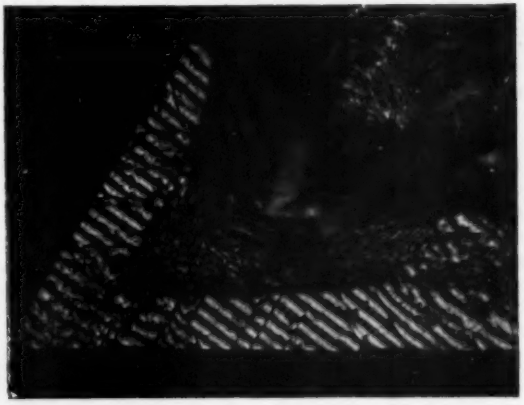
Fig 4 (right) and Fig 5 (below) are further examples of the interference fringe patterns of the octahedron face of synthetic diamond crystals.

cleaved surfaces also show good fringe definition, and this favours a general bulk reduction in reflectivity. A decision will have to await further experimenting.

The fringes in Figure 2 are of further interest in that they indicate both the smooth uniformity of the surface and show also a clearly formed hillock over one corner. Now we have repeatedly found in our sensitive phase-contrast studies that good cubic faces can show growth spiral hillocks which most commonly occur on corners of the cube face. This hillock is nothing more than an unresolved growth spiral.

Octahedron faces

Figure 3 shows the interference fringe pattern given by an octahedron face of a synthetic diamond crystal. It shows the hopper or skeletal type of pattern which occurs very often. One sees the fringes formed over a fairly flat raised



parapet region within which is a rough hollow part. From the fringes one concludes that (a) the parapet region is smooth and (b) there are numerous slip steps.

It is evident that these slip steps are dislocated regions. An analysis of the fringe pattern reveals that these steps have a screw dislocation character. The adjacent regions are inclined, in that the step height along the slip line runs away progressively till it diminishes to zero. Figures 4, 5, 6 & 7 are further examples of fringe patterns given by octahedral faces. Skeletal types and plane types are illustrated. The frequent appearance of the slip lines is noteworthy. These slip lines can and do appear in the three possible cleavage directions on any one face. It is almost certain that these lines have originated largely *after* growth for indeed they can be seen in Figure 5 to run across the hollow skeletal region.

It is re-emphasized that these are not screw dislocation growth spiral effects of the kind clearly visible on the cubic faces. There seems to be little evidence of additional growth on the octahedron face dislocated slip regions. It can be mentioned that from several thousand micro-crystals we have looked at only very few show good octahedron faces, that is good smooth faces. We include one example in Figure 6. Here apart from what looks like a mechanical fracture with a dislocated step, the fringes indicate the existence of a reasonably plane and smooth surface. Much more common is the type shown in Figure 7 which exhibits growth sheets, trigons and characteristic slip lines.

Fig 6 (below). An example of a good octahedron face.

Conclusions

These interferograms taken on the synthetic diamonds hardly bear any resemblance at all to the many (some thousands) of interferograms taken in this laboratory on natural diamond faces. The characteristic strikingly smooth cubic

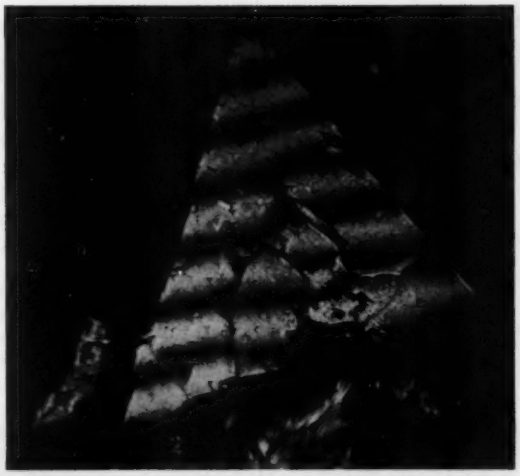


Fig 7 (above). An octahedron that exhibits growth sheets, trigons and characteristic slip lines.

planes, the skeletal hopper octahedron face formations and in addition the very frequent screw dislocation-type slip lines, all are features shown only by the synthetic crystals. There is a good possibility that these differences between the natural and the synthetic materials are due either to the inclusion of metallic carbide in the synthetic crystal or to the different mechanism in growth between the two kinds of material. Indeed either one or perhaps both of these together can be responsible for the observed differences. It certainly seems most likely that the mode of origin of the two types of crystal is very different. The one kind is found as widely spread individuals, the other as closely knit micro-clusters. This being so, it is hardly surprising that we do in fact find real differences between the two materials.

Spanish Import Regulations

In the list of goods under the Spanish import global quotas system for 1960, figure industrial diamonds (Customs Tariff Item No 251) for a value of $100,000.

The import plan distinguishes between two kinds of supplying countries: those under rating 'A'—all O.E.E.C. members and those countries authorising free convertibility of the means of payment obtained by Spain therefrom—and the remainder, included in the ' B ' kind, with which Spain has bilateral arrangements in respect of payments and trade. In the list of goods under the import global quota system, the value of bilateral quotas, 'A' countries, is given as $14,000.

The average imported value from 'A' countries, 1956-58, was $12,000.

Industrial diamonds figure among the more than 150 commodities and products, included in the additional and complementary import liberalisation decided on by Spain.

*The Use of a New Kind of Precision Micro-Sieve for Grain-Size Analysis**

by O. Lauer

In the range of very fine grain-sizes from 60 micron downwards, analytic sieve technology has always been dependent on wire mesh. The difficulties encountered in the production of this kind of mesh increase in proportion to the fineness of the mesh-size involved, and the accuracy of the openings leaves much to be desired. Although there are directions as to the margin of error permissible in meshes of up to 40 micron, many test sieves which do not comply with these conditions, manage to reach the market. Unfortunately most buyers are not in a position to check their test sieves for accuracy to gauge. Variations in the sieve results obtained by different observers for one and the same material can often be retraced to a lack of conformity on the part of the meshes used (assuming of course, all other conditions to be equal). Naturally these defects have been known about for a long time, but they were usually regarded with a blind eye, as sieving is still the simplest and surest method of determining grain size, and more accurate sieves were not available.

For some time now, however, precision micro-sieves with a mesh size of between 90 and 20 micron have been produced in America according to a special etching and electro-machining process.[1] It is interesting and informative to compare a photomicrograph of a precision sieve with openings of 30 micron, produced in this way, with that of a mesh sieve with a nominal mesh size of 33 micron (Figs 1 and 2).

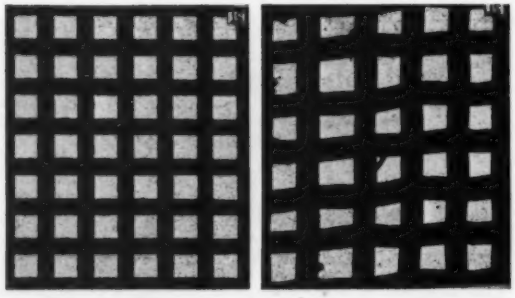


Fig 1. Microphoto of a 33 micron mesh sieve.

Fig 2. Microphoto of 30 micron precision sieve.

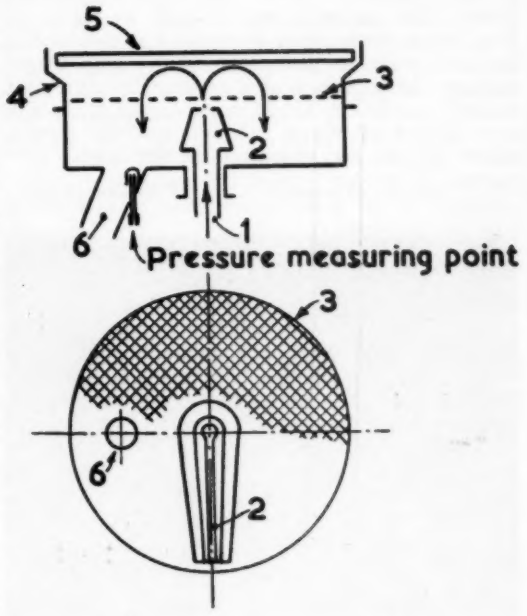


Fig 3. Diagram of the structure and method operation of the Air Jet Sieve.

Whereas with a mesh sieve one can hardly talk of a (definite) mesh width, the new precision sieve completely fulfils our requirements as regards accuracy. It should moreover be emphasized, that with the wire mesh of a mesh sieve, we are dealing with a three dimensional structure, so that the actual measurements of the area through which the grains pass, becomes even more complicated, whereas in the precision sieve, the free area, through which the grains pass, is more or less in a plane.

As no practical data were available for the most interesting micro mesh sieves, those of 20 or 30 micron, these were subjected to a detailed examination. It was thought fit to use the Air-Jet Sieve

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which has already proved to be especially excellent for the analysis in the fine grain range. The principle of this instrument has already been fully described.[2]

For the sake of thoroughness, however, the mechanical structure of the instrument and the manner in which it operates should be briefly revised (Fig. 3).

Air is sucked in through the tube 1. It then reaches the elongated nozzle 2 which rotates round the centre of the sieve close under the netting and then passes upwards through the wire mesh 3. The sieve drum 4 is sealed by the cover 5. The material which is being sieved is then whirled up and dispersed in the air in the space between the cover and the testing mesh. The jet of air now widely diffused passes once more through the wire mesh in the opposite direction and carries the fine grit through with it. The cover 5 is transparent and enables the process to be observed. The jet is drawn down at the opening 6, which creates the vacuum necessary for the current described above. The fine grit is separated in a mesh filter between the sieving apparatus and the vacuum pump. The jet of air when used normally shows a pressure differential of about 4 to 5 in. W.G. between the outside air and measuring point situated in the tube 6. It has proved effective when working with materials which are difficult to sieve or which are heavily coagulated, to use higher vacuum. An ordinary household vacuum cleaner which registers approximately 8-10 in. WG is suitable for this purpose, without much adaptation. Slight modifications to the commercial Air-Jet Sieve were necessary as this is intended as a test sieve of 8 in. diameter, and the new precision micro sieves are only available with a diameter of 3 in. Therefore in place of the usual test mesh a cover plate with central opening, 3 in. wide, leading to the micro sieve was inserted. The rotating elongated nozzle had to be adjusted to the measurements of the smaller sieve drum, that is reduced to approximately 1 1/3 in. It should be possible to observe the separating process through a transparent cover, with the micro-sieves as with the ordinary sieve drums. For this purpose a metal ring approximately ¼ in. high supporting a plexiglass cover, is placed inside the drum wall (Fig. 4).

Anticipating the most important results of the experiments to be described below: The precision micro-sieves, especially those having openings of 20 micron, represent an important advance in grain size analysis. Apart from the fact that an ultra-fine sieve, having a precisely defined opening size and a superior ad a mesh form is now available for the first time, we are also in a position with the aid of the air-jet principle to make an incursion into a field which was previously restricted to air elutriation techniques or sedimentation.

The length of time necessary for a completed sieving depends on certain factors listed below:

(1) The velocity of flow with which the sieving is carried out (corresponding to a vaccum of 5 or 8 in. WG);
(2) The amount of material being tested (weight of sample);
(3) Exact size of the free passage areas;
(4) The extent to which the material tends to coagulate.

Fig 4. The Air-Jet Sieve with two precision sieve drums used in the laboratory.

A 30 micron sieve was first to be examined in detail. As numerous measurements with 33 micron mesh sieves were already available, there was no doubt right from the beginning as to the efficiency of the precision sieve. Quartz powder

and limestone powder were used as test substances and their grain size distribution can be seen in Fig 5. The influence of the factors numbered 1-4 can be roughly described in the following way:

When sieving a material which tends only slightly to coagulate such as quartz powder, the duration of complete sieving, using 5 grammes initial weight and a vacuum of 8 in. WG amounts to 4 minutes—using the normal flow—only 5 in. WG duration of complete sieving is extended to 8 to 10 minutes. If the initial weight of the substance being sieved is restricted to 2 grammes —which naturally results in a slight loss of accuracy—sieving is completed after only approximately 2 minutes (vacuum 8 in. WG). More heavily coagulating material requires a somewhat longer period of time.

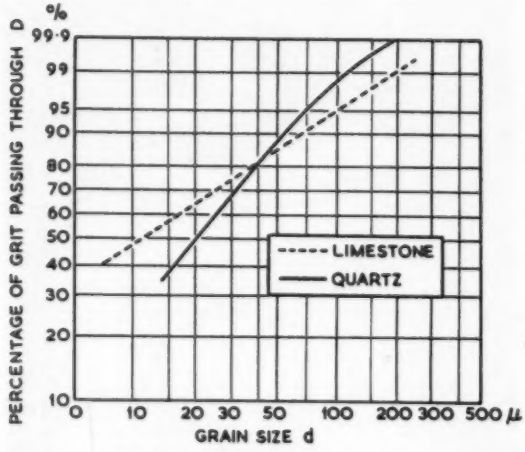


Fig 5. Grain size distribution of the test substances examined.

For limestone powder the following figures were found:

Initial weight 5 grammes
Vacuum 8 in. WG Duration of sieving 7 minutes

Initial weight 5 grammes
Vacuum 5 in. WG Duration of sieving 10 to 12 minutes

Initial weight 2 grammes
Vacuum 8 in. WG Duration of sieving 3 minutes.

Sieving times for other materials were similarly determined according to previous experiences with especially heavily coagulating materials. These values are sometimes increased by from approximately 50% to a maximum of 100%.

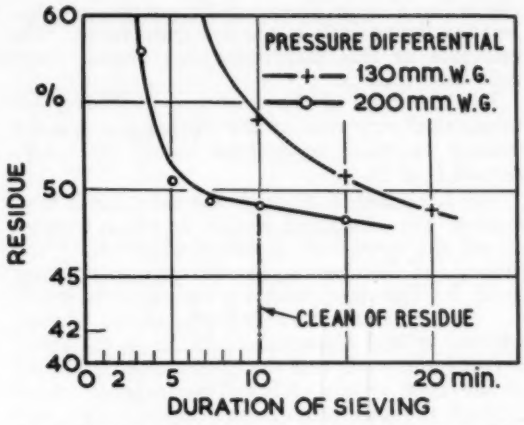


Fig 6. Sieving quartz powder with the Air Jet Sieve using a 20 micron precision sieve.

It is recommended, especially when working with difficult materials, that the air jet should be stopped for a short time at intervals, to enable the clogging grains in the material to be broken up with a soft brush.

The question of the size of the samples to be tested is determined by the degree of accuracy aimed at. On the basis of numerous measurements we can assume that with an initial weight of 5 grammes the deviation from the average value will amount to ± 0.3%, while with 2 grammes one has to reckon iwth deviations of ± 0.5%. Naturally these figures depend upon the greatest care being taken in sampling and upon exactly similar sieving conditions.

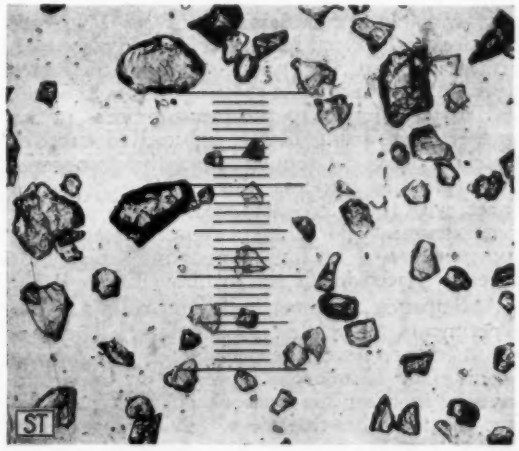


Fig 7. Oversize on the 20 micron precision sieve after 10 minutes sieving (1 graduation=12 micron) quartz powder.

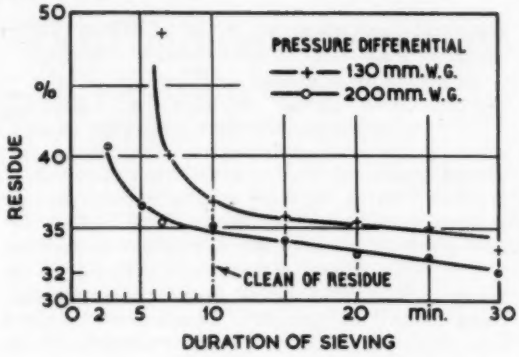


Fig 8. Sieving limestone powder with the Air Jet Sieve using a 20 micron precision sieve.

In order to obtain the shortest possible duration of sieving, it is also advisable to work with 8 in. WG. Any fears that the use of a stronger vacuum might result in a stronger supplementary crushing effect during the sieving process were dispelled by a special series of readings. Numerous parallel experiments were carried out, and it was found to be generally true, that the air jet sieve does not cause greater break down than other sieving processes.

When the behaviour of the 30 micron sieve had been examined, we began tests on the 20 micron sieve. At first quartz and limestone powder in the same range of grain sizes as shown in Fig 5 were used. The initial weight of the substance to be tested in each experiment was 20 grammes. In this way it was possible to ensure that the sieve load (g/cm^2) was the same as for the mesh sieves, 8 in. in diameter which are usually used with test quantities of 20 grammes.

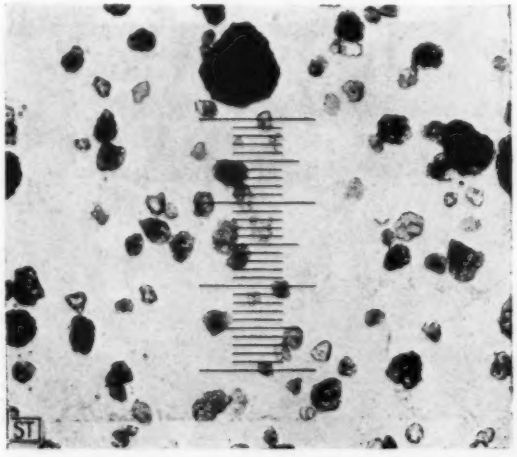


Fig 9. Oversize on the 20 micron sieve after 10 minutes sieving (1 graduation = 12 micron).

The characteristic curves for residue and duration of sieving are shown in Figs 6 and 8. These show in conjunction with the microphotos (Figs 7 and 9) of the sieve residue, that the duration of sieving, using a vacuum of 8 in. WG amounts to 10 minutes. Lower velocity air jets produced by a vacuum of 5 in. WG, cause this time to be doubled, that is to approximately 20 minutes.

Here, therefore, it is in every case better to work with a higher pressure differential of 8 in. WG. With this in mind we proceeded to investigate a wide range of other materials, especially those which are noticeably finer than the two test substances. It was found as a result of these experiments, that the minimum duration of sieving necessary is not lower than 7 to 8 minutes, while the maximum period of time necessary amounts to approximately 15 minutes (any interruptions in the sieving process, which may be necessary in order to eliminate clogging masses in the sieved material, are not included here). These, however, would not take up more than 2 to 3 minutes.

In this way ultra-fine wind sifted materials, mineral powders, which leave a residue of 0.1% with a 20 micron sieve, can be successfully sieved.

So far the 20 micron sieve has been successfully used in our laboratory for the following materials:

DDT powder insecticides with 5 to 10% DDT
Dolomite
Feldspar
Mica
Graphite
Limestone
Kaolin
Kieselguhr
Powdered coal (bituminous)
Corundum
Chalk
Lignite
Magnesite
Phosphate rock
Quartz
Silicon
Silicon carbide
Barium sulphate
Talc
Wheat meal
Cement
Cinnamon
Zincethylbidithiocarbonate
Zircon sand

There is in addition a large number of other materials which can also be analysed by this method.

In general it may be said that the majority of substances which can be successfully tested on the 44 micron mesh sieve can also be separated on the 20 micron precision sieve. On the other hand the groups of materials which cannot already be treated with the Air Jet Sieve, using the conventional mesh, cannot be separated with the micro-sieve.

Up to the time when this article was written, the 20 micron sieve had approximately 40 working hours behind it. No signs of wear, and more particularly no enlargement of the open areas through which the grains pass were apparent. Furthermore, our original fears that the mechanical sensitivity would be too high proved to be groundless. A wide range of applications in practical grain size analysis is therefore to be expected from these sieves.

The efforts of the makers are now directed towards the development of even finer sieves as small as 5 micron. Unfortunately we have so far had no success with a 10 micron sieve placed at our disposal for experimental purposes. This may be attributable to the smallness of the free area through which the grains pass in relation to the total surface of the sieve, a proportion estimated at 3%. In any case it is at the moment still too early to find a final verdict on the potential applications of this kind of sieve in the range of grain sizes smaller than 20 micron.

In addition a special application of the 20 micron sieve should perhaps be mentioned. This sieve just enters the grain size range in which other methods of grain size determination, such as sedimentation and air elutriation are used. It is well known that in sedimentation the size particle is calculated on the basis of Stokes' law, and it is determined by microscopic measurement.

The high degree of accuracy attained by the 20 and 30 micron sieves seems to justify their being treated as 'standard' instruments by which other processes can be tested, or gauged. Naturally this suggestion would only apply at first to materials of regular grain form, not plate-shaped, dendritic or needle-shaped.

References
1) Zur besseren Siebung. *Ind Engng Chem* 1959 Vol 51 (3) p 32A.
2) O. Laurer. Das Luftstrahlsieb, ein neues Geraet fuer die Durchfuehrung von Pruefsiebungen, *Staub* 1958 Vol 18 (10) pp 306-309.

Utrecht Spring Fair

The Spring Fair held at Utrecht this year (April 5-14) proved to be somewhat disappointing from the industrial diamond point of view.

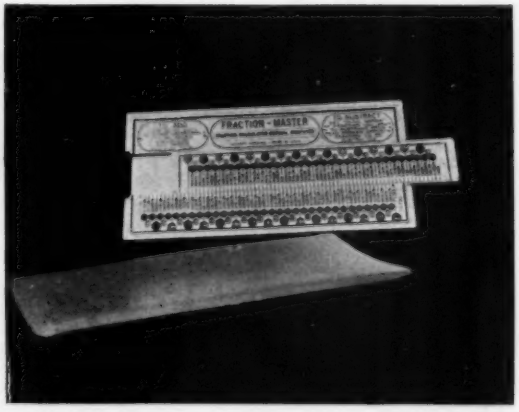
Since the Fair was oriented on to the subject of building and civil engineering, it might have been expected that the manufacturers of diamond saws and drills for use on stone and other building materials would have taken the opportunity to show how easily these substances can be cut, drilled or shaped with the aid of diamond tools of various types and forms. In the event only one diamond tool manufacturer (Diamant Boart, SA, Brussels, showing through their Dutch agents A. Bruyaux, Amsterdam, who were also showing machines for glass working made by the Autoflow Engineering Co Ltd of Rugby) took this opportunity. The exhibits on their stand attracted a great deal of attention, and it seems clear that had other manufacturers also shown their products, a number of useful contacts in the civil engineering and building world might have been made.

The exhibition taken as a whole was interesting and well laid out and during the time which our correspondent was there, was well attended. A number of foreign visitors, including some from the Far East and even from New Zealand attended this Fair, at which a great number of machines and other types of equipment for the building and civil engineering trades were well displayed, both in the halls of the fair ground and in the case of some of the larger pieces of equipment in the open air.

The Fraction Master

The Fraction Master is made by The Seymour Company, Chicago. It is a useful aid which will both add and subtract fractions and decimals. The layout is clearly done in black and red, making it quick and easy to use. All the necessary instructions are printed on it. As shown in the illustration a plastic case is provided.

At present The Seymour Company have no distribution in this country but are making enquiries to secure suitable representation.



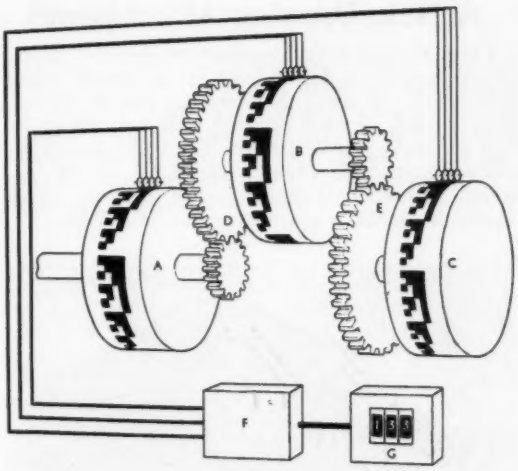
This illustration shows the fraction master and its case. The size is approx. 7" × 3½".

The Digitized Measuring Microscope

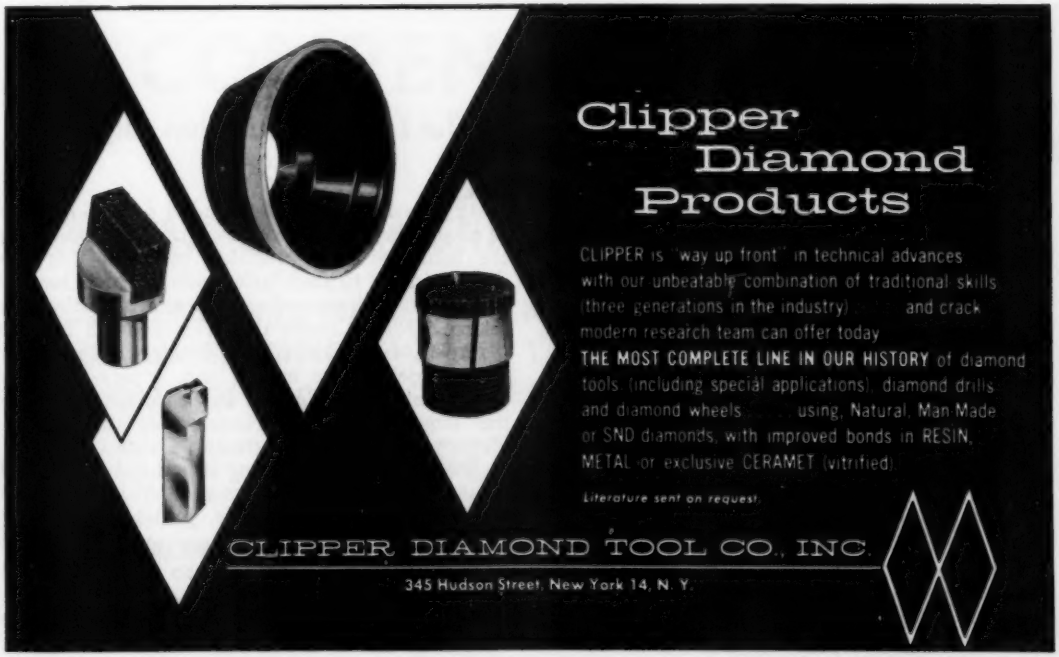
Hilger & Watts Ltd.

A measuring microscope fitted with digitizers has many advantages. It is quicker and easier to use than a standard instrument ; the time taken to record results is greatly reduced ; there is no eyestrain, and therefore less likelihood of error.

The digitizer is a self-reading scale that, in conjunction with ancillary equipment is capable of either instantaneously displaying and/or automatically recording the required information in digital, typed, or punched form at any convenient observation position. A second rotational digitizer can be geared to the first to record the position reached, in terms of complete turns (ie it acts as a coarse scale). This is referred to as a multiturn digitizer because it provides unambiguous readings over several turns of the input shaft. A complete multi-turn digitizer may comprise a 1000-division digitizer followed by three separate decade units giving a total scale length of one million divisions. This principle can be extended indefinitely without introducing any backlash errors.



Multi-turn digitizer (10 × 10 × 10). Three drums (A, B and C) have insulating and conducting areas in a binary code and are so geared together (D and E) that they read units, tens and hundreds. The output is decoded by the decoder (F) and displayed by in-line indicators (G) (or by printing or punching etc). The gears have a ratio of 10 : 1. The system is completely free from backlash errors and is reversible.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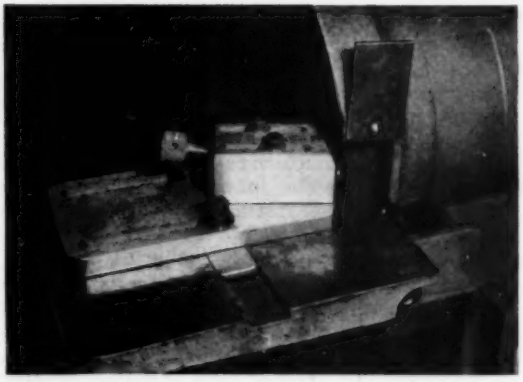
A New Dressing Attachment

Keith Precision Engineering are about to place on the market a new adjustable diamond wheel dresser for off-hand grinders, as shown in the illustrations. It will cover a range of machines of $\frac{3}{4}$ in. wide, work rests to 2. in wide, and, with the adaptor plate extends the range to $4\frac{3}{4}$ in., giving a total adjustment of 4 inches. The diamond carrier has a movement of $\frac{1}{2}$ inch.



The tool will true all wheels to a true cylindrical diameter or side face and has incorporated in the design a presenting and trailing angle, to give best results of dressing and self-sharpening action.

The tool is made of steel, hardened and ground to give long and reliable service. The grub screw on the body is for tensioning the diamond spindle so it will not move during dressing, but it can be turned by hand.

Research

The diamond research laboratory of Crown Mines, Johannesburg, has lately developed a new diamond grit made from crushed industrial diamonds which, used in wheels and saws, cuts at a 50% faster rate than the usual natural grit. This advance in the perfection of a natural diamond grit has resulted to a great extent from the challenge by synthetic diamonds, now being produced commercially for industrial purposes by General Electric in the USA.

The latter claimed recently that their synthetic crystals were a considerable advance on their original material and on the natural industrial diamond grit used in metal bonding, cutting and grinding tools. But according to South African reports the natural grit now produced at Crown Mines laboratory is superior to the new synthetic material and any other, and will be commercially available early next month.

Samples are available for microscopic inspection at The Industrial Diamond Information Bureau, 2 Charterhouse Street, E.C.1.

The I.E.A Exhibition Olympia 1960

At an exhibition that included a large number of precision instruments, and products that were the result of high precision machining, it was disappointing to find little evidence of industrial diamonds. An interesting exception was the new micro hardness tester that The Torsion Balance Company were exhibiting. There was scope for a great deal more and it was a pity that the opportunity was missed. In contrast to this was the large range of ceramic tools on display. Degussa (Degussit Department, Oxide Ceramics), in particular were showing an extensive range of ceramics including an interesting selection of grinding and polishing tools, guides and dies.

There was a certain amount of more general interest, especially some micro measuring and fine sieving instruments, and although, there could have been more of specific interest, the exhibition was well worth a visit.

News in Brief

On the occasion of the 20th anniversary of the founding of the firm of J. Aardewerk (Diamonds) Ltd, of Audrey House, Ely Place, London E.C.1, an illustrated booklet has been issued by the company, showing in a photographic series of 12 pictures the story of a diamond. Starting with a view of the Kimberley Diamond Mine, the set covers the entire process until the finished gem, represented by a photograph of 10 of the world's best known diamonds.

J. Aardewerk (Diamonds) Ltd, who deal in industrial, rough and polished diamonds, have added to the booklet a page of diagrams showing the various types and cuts of diamonds, with top, side and bottom views. The Copperman family, principals of the firm, will see the entry into the diamond trade of their fourth generation this year.

South West Africa's diamond production last year amounted to 930,659 carats. Sales of industrial stones totalled 52,223 carats worth £115,465. Exports accounted for 819,351 carats of gemstones, value £15,189,141.

South Africa's Minister of Labour and of Mines, Senator J. de Klerk, stated in Cape Town on April 1 that, according to estimates, the Union's yielding capacity in respect of diamonds would not exceed 1,757,000 carats a year by 1980, at about £6 sterling a carat, owing to the shortage of reserves.

The authorisation has been requested in Spain for the installation in the free port at Barcelona of a plant for the polishing and storing of industrial diamonds for export. It will be the first factory of its kind in the country and have a 25% foreign capital participation.

Uncut stones of between 0.07 and 0.025 carats will be imported. The machinery will be of Spanish manufacture.

Quantities deposited with the Government of Ghana during February 1960 totalled 143,804 carats, as compared to 145,401 carats in January. In 1959, the figures were: 150,961 carats for February, 162,637 carats for January.

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Venezuela's diamond mines are mainly in the southern area of Bolivar State, including La Paragua, Ochoa, Urdaneta, Pedro Cova, Uriman, Icabaru and Tumeremo. The industry is chiefly in the hands of small independent operators.

According to production figures of main items for 1958, recently released by the Venezuelan Division of Statistics of the Ministry of Development, diamond production totalled 90,004 carats.

Venezuela's diamond production last year amounted to nearly 95,000 carats, of which 69,673 cts were industrial stones, 15,104 cts were gem types, and the remaining 10,209 cts were boarts. Exports totalling US $1,200,000 represented about 87% of total production.

Main customers were the USA with 35,000 cts and the Bahamas with 30,000 cts destined for re-export to Britain and the USA; Belgium bought 18,000 cts as against 12,805 cts in 1958.

Angola's production during 1959 in respect of diamonds amounted to 1,015,690 carats. This compares to 1,001,240 carats for the year 1958.

During March 1960 the Government Diamond Office, Sierra Leone, bought diamonds worth £1,156,000, bringing the total of its purchases for the first quarter of this year to £2,555,000.

According to a report compiled by the UN Economic and Social Affairs Department for the Economic Commission on Africa—a survey covering economic development of the African continent since 1950—about 43 per cent of the value of Africa's total mineral output is accounted for by South Africa, excluding South West Africa.

Gold and uranium were primarily responsible for her leading position, with diamonds, coal, copper and asbestos contributing on a smaller scale.

Plans are ready for the construction of five factories to produce diamond cutting tools in the seven years ending 1965. They will be erected in the North Caucasus, outside Moscow, in the Ukraine, and in Siberia. All of them have mechanised assembly lines and up-to-date technology and equipment.

The new plants will make tools out of industrial diamonds mined in Yakutia, Eastern Siberia. The USSR's diamond output is to increase 16-fold as compared to 1958.

The Indian Minister of State in the Ministry of Transport and Communications stated on April 9 that a tentative scheme has been formulated to establish a free trade zone at Kandla, to increase its employment potential, and to attract industries to it.

The Minister said that if there was a demand for import of certain types of finished goods into the zone free of customs duty for re-export to nearby countries this would be considered, but it would not be possible to relax ordinary restrictions as existing in the rest of the country on articles like diamonds, gold and watches.

The Norton Company of America have announced that they have successfully produced a synthetic diamond grit.

Impregnated Diamond Products, Ltd., (who have now merged with Universal Grinding Wheel Co. Ltd.) are shortly to establish a department at their works which will investigate problems connected with the correct utilization of diamond tools. A comprehensive range of machines for demonstrations of drilling, grinding, trepanning, and honing with diamond tools will be provided. Among the diamond tools produced by this company are slitting discs of 4 in. diameter by 0.013 in. thick for slicing germanium and silicon. Thinner discs, it is stated, can be produced if necessary. The Uni-Neven demonstration unit is shortly to be sent to Europe, to tour industrial centres.

Tanganyika's diamond exports during November 1959 totalled 47,783 carats value £333,000, as compared to 41,129 carats value £375,463 during November 1958.

For the period January-November 1959 the figure was 553,237 carats worth £4,468,000, as against 459,295 carats worth £4,019,135 during the corresponding period in 1958.

During the first half of 1959, Canada imported from South Africa 68.352 carats of black boart for borers worth Can $288.804, and 447 carats of unset stones worth Can $117,376.

This compares to 55,548 carats of black boart worth Can $273,847 and 191 carats of unset stones worth Can $46,344 during the first six months of 1958.

The Basle Industry Fair 1960

by a Special Correspondent

The aim of the Fair is to give Swiss manufacturers an opportunity to show their products to the world. It is held on a vast permanent exhibition ground. The catalogue is well compiled and has a map of each hall.

Amongst the more interesting exhibitors were Diametal AG who were showing their range of diamond products and their catalogue contained a short survey of diamond tools in general. Eskenazi Werkzeuge AG ' EZI ' had a good range of hard metal and carbide tools and their technical news sheet discussed the use of ceramically bonded diamond grinding wheels for sharpening diamond tools. Other exhibits included jig boring and grinding machines and attachments for forming and sharpening carbide and ceramic cutting tools (Henri Hauser Ltd.), and AG fuer Oberflaechentechnik's X-17 diamond paste, and several surface grinders of Studer's Ltd. Also an automatic electronic surface grinder with a diamond truing device (Machines Adeka SA), and a hydromatic carriage for a grinding machine with a diamond truing holder that can be fixed on to the carriage itself or the bench (Maurice Scemana). Amongst the various gear grinders demonstrated by Reishauer Werkzeuge, was a truing machine for the profiling of grinding wheels. Its equipment included three pairs of truing diamonds capable of profiling the wheel at three different angles.

There was also on exhibition a selection of non-diamond abrasive and grinding wheels particularly by Sia Swiss Industrial Abrasives Ltd., who supply the metal, stone, wood and other industries with grinding tools. Another interesting non-diamond exhibit was the electrolytic grinder by Agathon Ltd. who also gave a comparison of the cost of grinding carbide tools by this method and with diamonds.

It was significant to see how prominent a place was given to hard metal and carbide tools by some firms, clearly demonstrating the importance they attach to these modern cutting tools. There was, of course, a very good display of measuring instruments for which Switzerland is justly well known.

The horological section proved disappointing. Here was a good opportunity missed to demonstrate the making of precision parts. Another criticism could be made about the way in which machines and machine tools were divided. They were in two sections, one for the machining of wood and the other for the machining of metal. As these were bound to overlap it would have been simpler to have arranged them according to the type of machine. Perhaps the most welcome feature of the Fair was its spaciousness. This enabled one to have a really good look at the many interesting items without the overcrowding one usually experiences.

The Diamond Exhibition Room

The Exhibition Room at 2, Charterhouse Street, which we mentioned in last month's edition, should be open by the beginning of June, is in fact now open. Anyone wishing to visit it should enquire at The Industrial Diamond Information Bureau at the same address.

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INDUSTRIAL DIAMOND ABSTRACTS

Industrial Diamond Information Bureau,
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Telephone : FLEet Street 1577

1960 Volume 17
JUNE

DIAMOND MINING AND INDUSTRY

Diamond : Sierra Leone

Anon. *Miner Tr Notes* 1960 Vol 50 (4) pp 6-7 (Apr)

The Chairman of the Diamond Board, created by the diamond ordinance of August 1959, announced on January 6, 1960, that purchases of diamond from licensed alluvial diggers reached a total value of approximately £5.7 million during 1959, an increase of more than £1.6 million over the value of similar purchases during the previous year. Although the Bank of West Africa and Barclays Bank are authorized to purchase alluvial diamond, almost all of the recent official buying has been by the Government diamond office at Kenema. More than £2.6 million worth of diamond has entered legal commerce through Kenema's facilities since its opening on August 4, 1959. A table shows in both carats and value the monthly exports of diamond from Sierra Leone in 1959. Figures for the Sierra Leone Selection Trust and for the Alluvial Diamond Mining Scheme are given separately. 1 table.

D *F.251.3672*

Mining in Sierra Leone

Anon. *Min J* 1960 Vol 254 (6501) pp 354-355 (Mar 25)

Illicit mining was only small-scale in 1959 while official purchases reached a record of £5,800,000. The activities of the Government Diamond Office are covered, as is the production of the Sierra Leone Selection Trust. The article also deals with other mining industries in the country.

D *F Hd.2598.3672*

Mining miscellany

Anon. *Min J* 1960 Vol 254 (6506) p 496 (Apr 29)

Venezuela's diamond production in 1959 amounted to nearly 95,000 ct of which 69,673 ct were industrials, 15,104 ct gems, and the remaining 10,209 ct boarts.

D *F.13.347*

Guiana's biggest diamond rush

Anon. *Diamond News* 1960 Vol 23 (6) p 21 (Mar)

Production in the Kurupung area rose to 2,738 ct in the first fortnight of January, compared with 660 ct for the corresponding period in 1959.

A *F.251.3674*

The mining industry in Tanganyika

Anon. *S Afr Min Engng J* 1960 Vol 71 Pt 1 (3504) pp 773, 775-776 (Apr 1)

Diamond production in 1959 was valued at £4.54 million, exceeding that of 1958. Important technical progress was made at the Mwadui Mine of Williamson Diamonds, and, at the neighbouring property of Alamasi Ltd, diamond recovery increased by one-third above the previous year.

D *F Hd.25.364*

Belgian Congo is still . . . one of richest diamond areas

Anon. *Diamond News* 1960 Vol 23 (6) pp 17, 19 (Mar)

A *Eb.365*

Little known rich diamond mine in the Free State

Anon. *Diamond News* 1960 Vol 23 (6) p 32 (Mar)

The Star Diamond Mine produces the best average quality gem diamonds found in South Africa, every one having a star at the centre, and a large number being white or blue-white in colour. High rewards are given for finds.

A *Ebb F.12.361*

More Soviet diamonds are to be expected. Mehr Sowjetdiamanten zu erwarten

Anon. *Dtsch Goldschmiede Ztg* 1960 Vol 58 (3) p 128 (Mar) (In German)

The news agency Tass reports that Soviet production of industrial diamonds is expected to be sixteen times greater in 1965 than it was in 1958. Five new factories are to be built near Leningrad to produce the tools necessary for the diamond industry.

K *Bbeb Ct*

Spot news . . . trends

Anon. *Amer Mach* 1960 Vol 104 (6) p 93 (Mar 21)

Russian seven-year plan ending in 1965 aims at the construction of five factories for production of diamond-tipped tools. Plants, using diamonds from new Siberian mines, will be built in the northern Caucasus, the Ukraine, in Siberia, and near Moscow.

K *N.33*

Diamond in dolomite : a Russian find

Anon. *Diamond News* 1960 Vol 23 (6) p 31 (Mar)

A *Ec.33*

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U.S.S.R. claims strike of gem diamonds

Anon. *Diamond News* 1960 Vol 23 (6) p 31 (Mar)

It is announced that a diamond cutting shop is being built in the Siberian town of Sverdlovsk to cope with the flow of diamonds from Yakutia and other newly found fields in the Urals. Aerial prospecting methods used were found to be unreliable, until new knowledge of what constitutes a favourable indication was obtained. Aeromagnetic surveying is also successfully used in searching for kimberlite pipes.

A *F.12.33*

Diamonds—decline in sales

Anon. *Economist* 1960 (Apr 9)

Diamond sales through the Central Selling Organisation in the first quarter of 1960 amounted to £20.4 million, a decline of £3.2 million from the peak reached in the same period of 1959. Sales of gem stones fell by £1.84 million to £14 million and sales of industrials fell by £1.35 million to £6.4 million. The sales do not yet include Russian diamonds and it is stressed that the latest industrial figure must be regarded as satisfactory since purchases for the US strategic stockpile have stopped, while production of synthetic diamond in the US has increased since 1959.

D *F.251*

New bill will benefit diamond industry

Anon. *Diamond News* 1960 Vol 23 (6) p 3 (Mar)

Refers to the Precious Stones Amendment Bill.

See *Industr Diam Abstr* 1960 Vol 17 p A90 (Apr).

D *F.25*

A feast of gems

Anon. *Gemmologist* 1960 Vol 29 (344) pp 50-55 (Mar)

Review of the exhibits in the Birmingham exhibition of jewellery and gemstones, 1960. 2 illustr. (To be cont).

A *Bb.27.321/F.27.321*

PHYSICAL, CHEMICAL, & MECHANICAL PROPERTIES OF DIAMOND

South Africa's synthetic diamonds

Anon. *Optima* 1960 Vol 10 (1) pp 48-49 (Mar)

Research into the production of synthetic diamond continues at Adamant Research Laboratory of De Beers Consolidated Mines. Different types of material have been produced but so far all have fallen within the category of abrasive diamond grit. If necessary, the grit can be produced on a commercial scale. 2 illustr.

D *Fh.13.361*

Diamond research : march of science

Anon. *Diamond News* 1960 Vol 23 (6) p 5 (Mar)

The Adamant Research Laboratory, producer of synthetic diamond, and the Diamond Research Laboratory at Booysens, now able to change various physical properties of diamond, assist in the development of all the South African mines as well as making great advances in actual diamond research.

A *Fh.131.361*

Still more man-made stones

Anon. *Diamond News* 1960 Vol 23 (6) p 21 (Mar)

The US Army's Research & Development Laboratory has developed synthetic diamonds, reportedly made by high temperature and pressure processing.

A *Fh Qc.342*

Improving the characteristics of natural industrial diamonds. Migliorate le carratteristiche dei diamanti industriali naturali

Anon. *Macchine* 1960 Vol 15 (3) pp 229, 231 (Mar) (In Italian)

Artificial and natural diamonds are compared and the new resinoid bonded diamond grit wheels are discussed, following the announcement by De Beers of their new products. 2 illustr.

M *F*Fh/Nv Urb*

U.S. Company's claim

Anon. *Diamond News* 1960 Vol 23 (6) p 21 (Mar)

The Norton International Inc is said to be able to produce synthetic diamonds which are claimed in most cases to be of higher quality for grinding than natural diamonds.

A *Fh Qc.342*

GE to market new imitation diamond for grinding use

Metallurgical Products Dept, General Electric Co. *Purchasing Week* 1960 Vol 3 (16) p 38 (Apr 18)

GEC has announced that it will sell synthetic diamond for use on metal bonded grinding wheels. The grit will be available in sizes up to 100 mesh. The new diamond has typical particles of single crystal and block shape in colours ranging from light green to grey-black. Crystal surfaces are said to be smoother than on GEC's synthetic diamond developed for use on vitrified and resinoid bonded wheels. Applications will include glass grinding, electrolytic grinding and grinding of sintered carbide tools, and also operations on synthetic sapphires, germanium, quartz and ceramics.

D *Nvh Urc.251.342*

Scientists notebook [:] Hydraulic press provides very high pressure

Anon. *Financial Times* 1960 (22069) p 13 (Apr 27)

An hydraulic press of revolutionary design is said to be capable of applying pressures great enough to convert graphite into diamond, yet overcomes the disadvantages of previous presses of similar capacity in that it can handle larger samples of raw material. Pressures of the order of 2 million lb/sq. in., or more equally to every side of a cylinder 3 in. long and ½ in. diameter, can be created. The new press will probably be used for producing sizeable experimental quantities of heat resistant metals, as well as for investigating new ceramics or materials having diamond-like properties. Research into the design of larger presses continues.

D *Fh Ha Vc*

A very high pressure-high temperature research apparatus and the synthesis of diamond

A. A. Giardini, J. E. Tydings, S. B. Levin. *Amer Min* 1960 Vol 45 (1-2) pp 217-221 (Jan-Feb)

A description is given of a research apparatus capable of reproducible sustained near-hydrostatic pressures to at least 100,000 atmospheres concurrent with temperatures exceeding 3,000° centigrade. An experimental example, *ie* the synthesis of diamond, is included. 3 illustr, 7 ref.

D *Fh Ha Vbb/Fh Ha Vcb*

Diamond may play big part in space and medicine

Anon. *Diamond News* 1960 Vol 23 (6) p 13 (Mar)

The rare blue diamond mined in South Africa can be attached to electric leads, so that it may be used for recording minute temperature changes as small as 1/500 of a degree. Diamond resists the effects of acid and high temperatures more successfully than some other elements used in thermistors.

See *Industr Diam Abstr* 1960 Vol 17 p A90 (Apr).

A *F Ud/Fp Wm*

Artificial colouration of diamonds : how it is produced and how it can be detected

J. F. H. Custers, P. T. Wedepohl. *S Afr Jeweller* 1960 Vol 23 (6) pp 6-7 (Mar)

Refers to the advances made with the high voltage cascade electron accelerator and to the need for further study in this field.

See *Industr Diam Abstr* 1960 Vol 17 p A122 (Apr).

A *F Hx Ukb*

Natural diamond grit

Industrial Diamond Div, Engelhard Industries Inc. *Tooling & Prod* 1960 Vol 26 (1) p 96 (Apr)

SND diamond grit, made up of needle-like particles, is claimed to increase grinding efficiency of resin bonded wheels in certain applications.

D *Nv Urb*

USP 2,909,961 (Aug 23, 1957) **A. S. Samuels sen Method of examining and classifying diamonds**

An image of the stone is projected enlarged onto a reticulated screen. The screen has a plurality of reticles of equal size and the size of the projected image of the entire stone is adjusted so that the image covers only a known number of reticles, *eg* for a circular screen of 1,000 sq. in. area divided into 1 in. squares. The stone is then classified by the ratio of reticles covered by the flaw area to the total number of the reticles on the screen. (2 claims). Ref cited : 3 USP.

J *F Hz Wcg.545*

PHYSICAL, CHEMICAL, & MECHANICAL PROPERTIES OF HARD MATERIALS

More synthetic inventions

Anon. *Diamond News* 1960 Vol 23 (6) p 21 (Mar)

A.S.E.A. is developing equipment so that production may be put on a commercial basis. At Philips, Eindhoven, experiments are taking place with high pressures and temperatures.

A *B Ct*

Ruby-red but is it ruby ?

J. Bannister. *Watchmaker* 1960 pp 66-68 (Feb)

6 illustr, 1 table. *A* *Bbeb.21*

The new hydro-thermal ruby synthesis. Die neue hydrothermale Rubin-Synthesis

K. Schlossmacher. *Dtsch Goldschmiede Ztg* 1960 Vol 58 (3) pp 119-120 (Mar) (In German)

K *Bbeb Ct*

The superposition method of solving crystal structures

V. I. Simonov. *Soviet Phys, Crystallogr* 1960 Vol 4 (3) pp 281-289 (Mar) (Original in Russian)

63 ref. *D* *Bd Ubb.21*

Determining the specific weight of precious stones by means of heavy liquids. Die Bestimmung des spezifischen Gewichtes bei Edelsteinen mit schweren Fluessigkeiten

B. W. Anderson. *Dtsch Goldschmiede Ztg* 1960 Vol 58 (3) p 118 (Mar) (In German)

Two similar stones can often be distinguished if their density is known, and a method of discovering this by means of heavy liquids is described. A list of suitable liquids is given.

K *Bb Um*

Electron-microscope studies of polishing rouge

Anon. *Glass* 1960 Vol 37 (3) p 123 (Mar). (Abstr in English, original in German)

19 ref. *A* *Rmj Wcmm.21*

New Zeiss instruments at the Leipzig Spring Fair 1960. Neue Zeiss-Geraete zur Leipziger Fruehjahrsmesse 1960

R. Jobst. *Feinmechanik u Optik* 1960 Vol 77 (3) pp 77-83 (Mar) (In German)

Among instruments described are the new light slot instrument in which magnification changes are simplified and high enlargement work is improved ; and the new industrial spectroscope, Iskop, which can also be used for non-metallic materials. 16 illustr.

K *Wc.27.322*

Heavy cuts with carbide at low speeds

Alfred Herbert Ltd, Coventry. *Metalworking Prod* 1960 Vol 104 (10) pp 426-429 (Mar 9) ; *Mach Tool Rev* 1960 Vol 48 (283) pp 2-5 (Jan-Feb)

Case studies of this new grade of carbide, Ardoloy AK, introduced in 1959 for machining at medium to low speeds, coarse feeds and heavy cuts. On steel, cuts of over 1 in. deep and feeds of 0.06 in./rev are well within its capacity and yet it can perform better, under suitable conditions, at $\frac{1}{4}$ in. depth of cut and 0.005 to 0.07 in./rev feed. Toughness is claimed as its outstanding feature, especially where it is important that the cutting tool should not be the limiting factor in the rate of metal removal. Since Ardoloy AK has a comparative immunity to chipping of the cutting edge, the fields of application are wide.

See *Industr Diam Abstr* 1959 Vol 16 p A39 (Mar).

9 illustr. *E* *Bfd Ceq Pdc Unl*

How oriented graphite copes with high heat problems

Raytheon Co, Waltham, Mass. *Iron Age* 1960 Vol 185 (4) pp 92-93 (Jan 28)

Properties and uses of Pyrographite are described.

See *Industr Diam Abstr* 1960 Vol 17 p A32 (Feb).

3 illustr. *D* *Bhb U*

Research on the mechanical properties of metals

Anon. *Tech News, US Bur Stand* 1960 Vol 44 (3) pp 46-50 (Mar)

Describes the National Bureau of Standard's fundamental research programme. 8 illustr, 15 ref.

D *Bf Un.131.342*

Advancements in technical ceramics

F. J. Fallon (Raytheon Co). *Ceramic Age* 1960 Vol 75 (3) pp 24-28 (Mar)

Amongst materials for high temperature use are synthetic sapphire and fused quartz. 6 illustr, 1 table.

A *Bl.132*

Reflexion electron microscopy using diffracted electrons

J. S. Halliday, R. C. Newman. *Brit J appl Phys* 1960 Vol 11 (4) pp 158-162 (Apr)

Crystalline surfaces have been examined in the reflexion electron microscope with the angles of illumination and viewing adjusted so that diffracted electrons contributed to the images. In this way, the size and distribution of the diffracting regions have been determined. A resolution of 80° AU has been obtained, which is at least four times better than that obtained in normal reflexion micrographs. 5 illustr, 13 ref.

X *Bd Cz Wcmm*

Material properties studied at 4,000° F

Battelle Memorial Institute. *Prod Engng* 1960 Vol 31 (13) p 15 (Mar 28)

An apparatus studies properties of refractory metals, graphites, and ceramics at temperatures of 2,000 to 4,000° Fahrenheit. It gives such information as tensile strength and compressive stress-strain curves, as well as shear and bearing strength of specimens subjected to high temperatures. The apparatus, as yet unnamed, consists of a loading device, high temperature vacuum furnace, temperature and strain measurement devices and a power source. 1 illustr.

D *Vbb:Ba.21*

Microstructural features and dislocations on thermally etched sapphire surfaces

H. Palmour III, J. J. du Pleissis, W. W. Kriegel. *Bull Amer ceram Soc* 1960 Vol 39 (4) p 179 (Apr 15)

Paper given at 62nd Annual Meeting of the American Ceramic Society. *D* *Az Bbd Cpz U*

DIAMOND, ETC, IN INSTRUMENTS

Ruling engine slides on sapphires

Anon. *Prod Engng* 1960 Vol 31 (10) pp 44-45 (Mar 7)

In this machine, which rules up to 50,000 lines/in. on glass, the diamond used to rule the gratings is mounted in a diamond carriage that bridges the gap between two round ways. The bearing surfaces running on these ways are 4½ × ½ × in. sapphire slabs cemented to cast-iron pads fitted to each end of the diamond carriage. Precious stones as bearing surfaces are claimed to provide maximum smoothness and hardness plus excellent resistance to temperature variations. 4 illustr. *K* *Bm Cpf Nc*

The ruling of diffraction gratings

J S. Clark. *Hilger J* 1960 Vol 6 (1) pp 3-7 (Jan)

The first production of a transmission diffraction grating by ruling equally spaced parallel straight lines with a diamond point on a glass surface was probably in the early nineteenth century. The development of the technique is traced. 4 illustr, 15 ref.

D *Bm Cpf Nc Tfd*

Dependence of the form of indentation on the symmetry of the crystal faces in the determination of hardness by penetration of a diamond pyramid

V. A. Mokievskii. *Soviet Phys, Crystallogr* 1960 Vol 4 (3) pp 381-384 (Mar) (Original in Russian)

On the basis of the symmetry of the diamond pyramid and of the crystal faces, all the possible classes of symmetry of indentation are derived, and many of them are confirmed experimentally. The suggestion is made that it may be useful to take into account the symmetry of the indentations when determining the orientation of the grains in a polished specimen. Certain additions are proposed to the design of the PNT-3 instrument, which are desirous when the hardness is to be determined on different faces of a crystal. 5 illustr, 6 ref. *X* *Cv Nd Ub*

The low temperature method in electron diffraction analysis

V. F. Dvoryankin. *Soviet Phys, Crystallogr* 1960 Vol 4 (3) pp 415-435 (Mar) (Original in Russian)

13 illustr, 6 tables, 105 ref.

D *Uklc Vbc*

Spot news

National Physical Laboratory. *Metalworking Prod* 1960 Vol 104 (17) p 5 (Apr 27)

A prototype instrument can measure bores down to 0.03 in. diameter and 1½ in. long to an accuracy of about ±0.00002 inch. Stylus stem deflection problems met in earlier small bore instruments are overcome by a sensitive electronic device, which reduces the measuring force at the stylus tip to such a value that the resulting stem deflection is negligible. The stylus tip is coated with a thin, non-magnetic layer to prevent it sticking to the wall of the bore during feed motion.

D *Az Cz Tdb We*

Measuring the hole diameter during honing

E. M. Shapiro. *Machines & Tooling* 1959 Vol 30 (11) pp 32-34 (Nov) (Original in Russian)

Devices used for this purpose can be divided into five groups. One such device is described and illustrated. It was found that only diamond tips fitted to the probes showed sufficient wear resistance. As a result of using the automatic measuring device described, it is claimed that the production rate was increased by over 1.5 times. 4 illustr.

E *Chh Pr Wpz*

Concentricity a la chart

Newall Group Sales Ltd, Old Fletton, Peterborough. *Prod Engng* 1960 Vol 31 (13) p 9 (Mar 28)

A machine that maintains concentricity to within 0.000005 in. is now being built by Optical Measuring Tool Ltd for laboratory use. It has a measuring range of ¼ to 6 in. on id, ⅞ to 6 in. on od; magnifications of 1,000 and 5,000 times are possible. A spindle, carrying a spring-loaded stylus to contact the test piece, rotates at 1 rev/min in an air bearing. As it moves, the stylus generates a signal that is amplified and fed to a chart recorder on which radial motion of 0.05 in. represents 0.00001 in. at 5,000 magnification. 1 illustr.

D *Unz V W*

A high precision pneumatic test indicator

I. G. Morgan, F. R. Tolman (National Physical Laboratory). *Mach Shop Mag* 1960 Vol 21 (4) pp 229-231 (Apr)

The difficulty of measuring rather inaccessible points is greatly eased by using an instrument with a remote scale, flexibly connected to the measuring head. Further, if it is necessary to mount the indicator in such a way that rigidity becomes impaired, accuracy may be improved by using a contact load weighing much less than that characteristic of ordinary dial indicators. The pneumatic technique is said to offer a ready means of overcoming disadvantages. An instrument using the technique is described here, with particular attention paid to the measuring head itself. Construction, mode of operation and performance are discussed. 3 illustr, 2 ref. *D* *Wj*

Application of the interference microscope MII-4 to the study of crystal surfaces

S. Sh. Gendelev, G. V. Plekhanov. *Soviet Phys, Crystallogr* 1960 Vol 4 (3) pp 403-405 (Mar) (Original in Russian)

3 illustr, 6 ref. *D* *Bd Ubm Wcmp.21*

Defectoconoscope devices for studying optical anomalies in crystals and determining the orientation of watch jewels

S. V. Grum-Grzhimailo. *Soviet Phys, Crystallogr* 1960 Vol 4 (3) pp 405-407 (Original in Russian)

2 illustr, 3 ref. *D* *Bd Ubc V W*

Engineering log

Anon. *Min Mag, Lond* 1959 Vol 101 (5) pp 254-257 (Nov)

A new mass spectrometer, the M.S. 7, which measures minute impurities in solid substances by spark ionization, should be of considerable interest in the engineering and metallurgy fields. Analyses, made down to 0.01 parts/million, have been applied to materials including high-purity graphite, germanium, silicon, titanium, and tungsten.

D *Bf Cz Wcp*

The X-ray pulse diffractometer : a new method of registering intensities using the X-ray diffractometer

V. V. Sanadze. *Soviet Phys, Crystallogr* 1960 Vol 4 (3) pp 339-344 (Mar) (Original in Russian)

8 illustr, 8 ref. *D* *Wce*

HARDNESS AND WEAR TESTING

Portable hardness tester

Steel City Testing Machines Inc, 8817 Lyndon Ave, Detroit 38. *Tooling & Prod* 1960 Vol 26 (1) p 140 (Apr)

Because it can be fitted with an electromagnetic or chain clamp, the Indentometer can make Rockwell tests in the factory or field. The clamp can be applied to flat or curved surfaces, large work, and ferrous or non-ferrous metals. 1 illustr. *D* *Wgh*

The geometrical definition and evaluation of surface roughness in the M-system

W. M. De Vries. *Microtecnic* 1960 Vol 14 (1) pp 23-24 (Feb) (In English)

4 illustr. *A* *Unf.21*

Effects of clearance and rake angles on tool life

E. Bodart, G. Andri. *Microtecnic* 1960 Vol 14 (1) pp 30-33 (Feb) (In English)

5 illustr. *A* *Pd.21*

Getting more out of your cutting tools and holders

H. Conn. *Carbide Engng* 1960 Vol 12 (3) pp 11-15 (Mar)

When the inter-relation of the tangential, radial, and longitudinal forces at work on tools is known, steps can be taken to reduce tool wear and so increase life. 6 illustr, 2 ref, 2 tables.

A *Pd Uqe:Unr*

Notes on surface roughness. Note sulla rugosità superficiale

P. L. L. d'Ancona. *Macchine* 1960 Vol 15 (3) pp 161-167, 247 (Mar) (In Italian)

23 illustr, 11 ref. *M* *Unf.21*

BP 817,971 (Nov 8, 1956) **J. K. Pocknee, Penetraskope Ltd**

Attachment devices for hardness testing instruments

A magnetic clamping attachment comprises a frame for adjustably mounting the hardness tester, an electromagnet or several such magnets in the frame with at least three spaced pole pieces, two of which are fixed, and a movable pole piece to be locked in adjusted position when contacting the body constituting or carrying the test piece. The frame may be attached to a surface that is not flat, *eg* to a cylindrical rod or roll, as the movable pole piece may be adjusted to fit any surface. (17 claims, 7 illustr)

J *Psc Wgh.545*

TRUING OF GRINDING WHEELS

Selecting wheel dressers

Anon. *Grinding & Finishing* 1960 Vol 6 (3) p 17 (Mar)

Reply to reader's question.

Explains the action and applications of the Huntington or star type dresser and contrasts these with the uses of diamond as a wheel truing medium.

D *Nj*Pf*

The care and use of diamond tools

New York Diamond Tool Co Inc. *Grinding & Finishing* 1960 Vol 6 (3) p 36 (Mar)

Ten rules are listed.

D *N.138/N.1451*

Form grinding jet blades

Anon. *Mach Tool Blue Bk* 1960 (2) pp 109-111 (Feb)

Serrations of 'pine-tree' forms are cut into the grinding wheel with a diamond forming tool. Grinding tolerances are held to 0.0015 in. and parallelism to 0.0005 in. The blank wheels are manually adjusted for parallelism and moved in to touch the diamond tool which has the same serrations required on the blade lock. One seven-pass cycle of the machine usually brings the wheels to within 0.005 in. of the finished tolerances. About ten passes of the diamond truers, removing from 0.0010 to 0.0015 in. at each pass, are required to bring the wheel face to final form. 3 illustr.

E *Ab Cgh Nj*

Grinding for maximum life, minimum maintenance

D. Ward. *Grinding & Finishing* 1960 Vol 6 (3) pp 34-36 (Mar)

Describes grinding of rotor vanes for refrigerator compressor units. The problem of truing a radius in the wheel of a Gallmeyer-Livingston 55 profile grinder was finally solved by the use of a small ballas diamond tool, less than $\frac{1}{16}$ in. diameter. Because of the crush truing action of the ballas diamond, the wheel can be trued to produce a finish of 10 r.m.s. or better. This would be impossible with a worn diamond point which would leave fine lines on the wheel face from its corners or shoulders. 4 illustr.

D *Ab Cgh Nj:Chch Pr*

New profile wheel dressing attachment for B.S.A. centreless grinders

B.S.A. Tools Ltd, Mackadown Lane, Kitts Green, Birmingham 33. *Machinery, Lond* 1960 Vol 96 (2470) p 612 (Mar 16)

A template-controlled profile wheel dressing attachment, for use on B.S.A. No 8 and 11 centreless grinders, can dress wheels up to 12 in. wide. At the end of a dressing stroke the diamond is moved away from the wheel automatically and returned longitudinally to its starting position; this is followed by automatic advancement of the diamond towards the wheel in readiness for the next dressing stroke. If required, the diamond may be brought clear of the wheel at any point in the stroke by operating a lever. 1 illustr.

D *Ab Cg Nj*

Diamond wheel dresser

Niagara Cutter Div, Bollier-Damerall, N. Tonawanda, NY. *Tooling & Prod* 1960 Vol 26 (1) p 129 (Apr); *Amer Mach* 1960 Vol 104 (6) p 166 (Mar 21)

A self-contained motorized diamond wheel dresser is said to obtain fast, efficient cleaning and truing because dressing wheels are run opposite to or at angles to the rotation of the diamond wheel. 1 illustr.

D *Nj Pj*

Norton transfer-type crankpin grinder

Norton Co, Worcester 6, Mass. *Machinery, Lond* 1960 Vol 96 (2470) pp 603-604 (Mar 16)

A 7-station transfer-type crankpin grinder is fully automatic and will handle motor car crankshafts at the rate of 60/hour. The grinding wheel is held clear of the working position for 17 sec between cycles; during this period the face and corner radii are trued, while the crankpin is being loaded and unloaded. Wheel truing may be done at the end of each grinding cycle, or at pre-determined intervals. Wear of the diamond is compensated automatically, as is reduction in grinding wheel diameter resulting from truing and wear. 2 illustr. *D* *Agn Chc Pr Psf*

The manufacture of Everest office machines

R. E. Green. *Machinery, Lond* 1960 Vol 96 (2470) pp 576-583 (Mar 16)

Among operations described is grinding the type bars to thickness. The 11.8 in. diameter wheel is trued by a diamond held on a circular magnetic chuck. 9 illustr. *D* *Ab Cg Nj/Agc Chc*

K.P.E. diamond wheel dresser

Keith Precision Engineering, 276 Upper Shoreham Rd, Shoreham-by-Sea, Sussex. *Metalworking Prod* 1960 Vol 104 (16) p 722 (Apr 20)

The dresser is for off-hand grinders and will cover a range of machines having ¼ to 2 in. wide work rests: with the adaptor plate, the range is extended to 4½ inches. The diamond carrier has a movement of 2 inches. A presenting and trailing angle are incorporated in the design. The tool is of steel. A grub screw on the body applies tension to the diamond spindle, so that it will not move during the dressing, but it can be turned by hand. 1 illustr. *A* *Mf Njz*

In shops around the country [:] Wheel dresser

Pratt & Whitney Aircraft, East Hartford, Conn. *Machinery, NY* 1960 Vol 66 (7) p 160 (Mar)

Instead of a single-point diamond tools, the wheel dresser on a centreless grinder used at Pratt & Whitney consists of small natural diamonds cemented in a powder-metal matrix. As the wheel is dressed, the matrix wears away at a uniform rate, exposing fresh cutting edges of the diamond grit, which makes it unnecessary to remove or rotate the dresser throughout its life. 1 illustr. *X* *Ab Cg Nj*

J & S adds vice jaws, two grinding wheel dressers

J & S Tool Co Inc, 87 Dorsa Ave, Livingston, NJ. *Amer Mach* 1960 Vol 104 (7) p 228 (Apr 4)

A wheel guard dresser, adaptable to quills of 3 to 3½ in. diameter, is used for surface grinders while the formed grinding wheel is maintained in position in relation to the work. A straight diamond dresser is designed for use in conjunction with this. A diamond block with the diamond protruding from one corner will true the periphery of the wheel. 1 illustr. *A* *Ab Cgz Njz*

Swiss P 341,374 (June 11, 1956) **A. Rickenmann, Reishauer-Werkzeuge AG**

Device for producing accurate grinding worms for gear grinding machines working according to the helical generating method. Einrichtung zur Herstellung genauer Schleifschnecken fuer Zahnradschleifmaschinen, die nach dem Schraubwaelzverfahren arbeiten

The truing tool carriage is moved, dependent on pitch and rotation of the grinding worm, by using gear changes and a lead screw so that the length of movement for a full turn of the grinding wheel is a multiple of the pitch of the worm. A lever system transmits the shift of the lead screw or nut to the carriage, at the same time decreasing the amount of movement in the desired ratio. Fig 1 is a plan of the truing mechanism with truing tool 98 on carriage 90 mounted on slide 85. The carriage arrangement is more clearly shown in Fig 2. Tool 98 is profiled like the tooth of a rack. In Fig 1 rotation of lead screw 7 causes nut 70 to move to the left, turning lever 75 and thus also moving truing tool slide 85 with slide 90 and tool 98. The device is hydraulically operated. (1 claim, 8 illustr).

J *Ab Cg:Ad Ceg Pr.545*

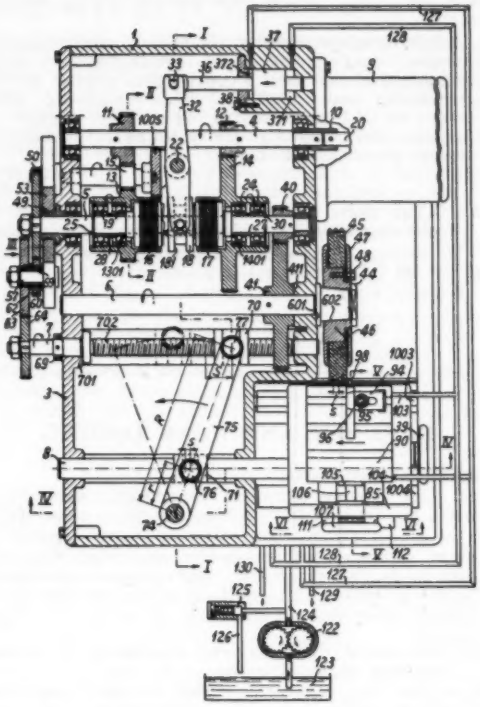
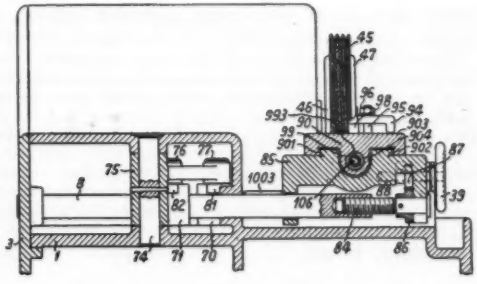


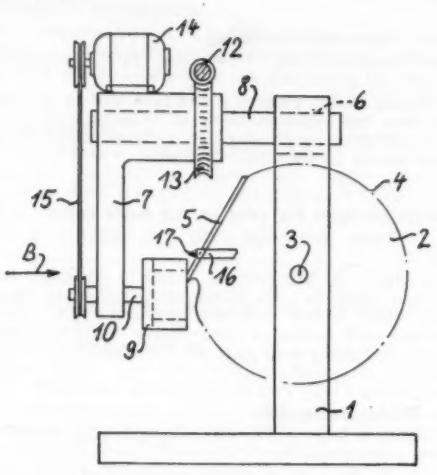
Fig 1 (above). Plan of the truing mechanism with tool 98 on carriage 90 mounted on slide 85.

Fig 2. The carriage arrangement. Swiss P 341,374.



DAS 1,068,600 (Feb 27, 1958) **A. Ritcher, B. Schubert, Hauni-Werke Koebert & Co KG**

Automatically adjustable grinding device for the knives of a tobacco cutter. Selbsttaetig nachstellbare Schleifvorrichtung fuer die Messer eines Tabakschneiders



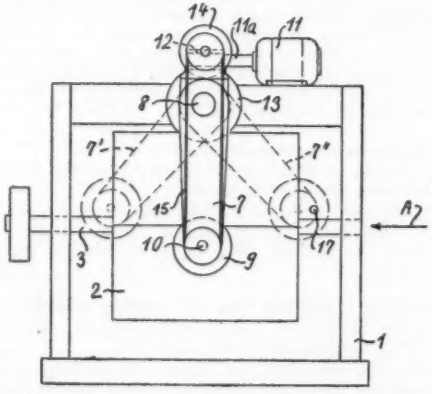


Fig 3 (top). Cutting circle 4 and diamond tool 17 are shown.

Fig 4. Another view of the automatically adjustable grinding device. DAS 1,068,600.

One or several cup grinding wheels g are movable along the cutting edges of the knives mounted in a support 7 oscillating between positions 7′ and 7″ shown in Fig 4. Fig 3 shows cutting circle 4 and diamond tool 17 for keeping wheel 9 trued so as to maintain the diameter of cutting circle 4 constant. (5 claims, 4 illustr. *J* *Az Ceg Pd.545*

LITERATURE REQUESTS
Please quote the page number of the Bibliography containing the original reference, and the author and title of the article, in all cases.

PRECISION MACHINING OF METALS

Economic considerations in the application of sintered carbide and ceramic cutting material in machining techniques. Wirtschaftliche Betrachtungen bei der Anwendung von Hartmetall und Schneidkeramik in der Zerspanungstechnik

H. J. Randhahn. *Fertigungstechnik, Berl* 1960 Vol 10 (4) pp 205-211 (Apr) (In German)
11 illustr, 6 ref. *A* *Pdc/Pdd*

How to work zirconium—I/II

G. G. Grimes. *Amer Mach* 1960 Vol 104 (6) pp 143, 145 (Mar 21)

In machining zirconium, satisfactory results can be obtained with both sintered carbide or HSS, although carbide gives better finishes and higher productivity. Polishing or honing cutting edges gives added life. Best results in both centreless and surface grinding are obtained with silicon carbide vitrified wheels applied at conventional speeds. 1 illustr, 2 tables.
K *Bfn Ceq Pdb/Bfn Ceq Pdc/Bfn Chc Pe Rgc Urf*

Solid carbide drills handle hardened steel

L. E. Schuman. *Carbide Engng* 1960 Vol 12 (3) p 19 (Mar)
1 illustr. *A* *Bfdz Cfb Pl*

How to evaluate cutting tools

C. J. Oxford jun. *Metalworking Prod* 1960 Vol 104 (14) pp 610-612 (Apr 6)

It is essential to have the same conditions in tests as are encountered in production. A large number of uniform tools and workpieces must be used, *eg* 18-24 pieces when testing drills. The best method of recording results is on cumulative probability graph paper. Tool failure and the tool change factor are discussed briefly. 4 illustr. *A* *Pd.1312*

Copy turning lathes [Pt II]

I. B. King. *The Prod Engr* 1960 Vol 39 (3) pp 147-168 (Mar)

This part deals in more detail with machines in current production, particularly those designed specifically for copy turning purposes. 43 illustr. (To be concl). *D* *Ceqbz Pr*

Cutting tool forces

H. Conn. *Mach Tool Blue Bk* 1960 Vol 55 (3) pp 115, 117-120 (Mar)
4 illustr, 1 table, 1 ref. *E* *Pd.21*

Sintered carbide tools for precision machining. Hartmetallwerkzeuge fuer die Feinbearbeitung

H. J. Burmester. *Eurotec* 1960 (7) p 26 (Apr) (In German)
Book, DEVA-Fachverlag in der Deutschen Verlags-Anstalt GmbH, Stuttgart. 55 pp, illustr. Price DM 2.60.
[Not in library of Industrial Diamond Information Bureau]. *A* *Pdc*

Tool engineering in Europe

M. Kronenberg. *Tool Engr* 1960 Vol 44 (3) pp 195-197 (Mar)

Sections deal with ceramic cutting tools, double rake angle, maintenance and machine design, and precision machine tools. It comments on interesting European articles giving full references. One article mentioned covers the uses of diamond tools for obtaining high accuracy on metals used for decorative purposes.
E *Bf Ceq N.139*

Machining of iron materials. Zerspanung der Eisenwerkstoffe

G. Vieregge. *Industr Anzeig* 1960 Vol 82 (29-30) p 468 (Apr 12) (In German)

Book, Verlag Stahleisen mbH, Duesseldorf. 1959, 346 pp, illustr. Price DM 40.–.

The following subjects are treated: processes of cutting iron, chip characteristics of iron materials, and the cutting materials themselves, including the new sintered oxide. An extensive bibliography of sources both in German and English is given.

[Not in library of Industrial Diamond Information Bureau]. *A* *Bfc Ceq.52*

Drilling and thread cutting machine with many applications. Vielseitig verwendbare Bohr- und Gewindeschneidmaschine

Goeltenbodt Praezisionswerkzeug- und Maschinenfabrik KG, Stuttgart. *Werkst u Betr* 1960 Vol 93 (4) p 187 (Apr) (In German)

1 illustr. *A* *Ceqbd Pr/Cfb Pr*

Developments in profile turning machines

F. Dodgson. *Mach Shop Mag* 1960 Vol 21 (4) pp 190-194 (Apr)

The position of profile turning in the field of modern production is assessed. 4 illustr.

D *Ceqg Pr*

Drilling compromises

H. Conn. *Mach Tool Blue Bk* 1960 (2) pp 91-96 (Feb)

The effect of point-angle on drill life is discussed. 5 illustr. *E* *Pl Uqe*

Fundamentals of economic manufacture—17

W. F. Walker. *Tooling* 1960 Vol 14 (3) pp 41-43, 46-55, 57 (Mar)

Full use must be made of the facilities for multiple tooling and the combination of cutting layouts when planning production cycles for parts needing to be machined on a turret lathe, as faulty tooling causes greater time loss on this type of machine than any other. Tooling layouts are discussed and tables give various sequences of operation. 16 illustr, 7 tables.

D *Ceqb Pr:Pd.139*

How Alvis use ceramic tools

R. M. Gill, G. Spence. *Metalworking Prod* 1960 Vol 104 (13) pp 561-565 (Mar 30)

The results being obtained at Alvis Ltd, Coventry, are in sharp contrast to the rather disappointing results reported by many who have tried to use ceramic tools in the same way. Case studies show some of the normal production operations that have been converted to ceramic tooling, in each case with some advantage over the previous method. 5 illustr.

E *Bf Ceg Pdd*

Results achieved with ceramic cutting tools. Esperienze nell'impiego di utensili ceramici

G. B. Gamondi, G. Maestri. *Macchine* 1960 Vol 15 (3) pp 205, 207, 209 (Mar) (In Italian)

2 illustr. *M* *Pdd.21*

Use of grade A.S. and T.S. Allenite tools

Anon. *Edgar Allen News* 1960 Vol 39 (451) p 18 (Jan)

Reply to question.

Recommendations are made on speeds and feeds when using Allenite tools for machining steel tyres and pipe flanges. *D* *Agz Bfd Ceq Pd*

Production of compressed air units

Shipston Engineering Co Ltd. *Mach Tool Rev* 1960 Vol 48 (283) pp 6-11 (Jan-Feb)

Some operations on Herbert capstan lathes and drilling machines for the production of compressed-air equipment are covered. 13 illustr.

D *Ceqb Pr/Cfb Pr*

Clever fixture aids machining

Alkon Products Corp, Hawthorne, NJ. *Iron Age* 1960 Vol 185 (5) p 95 (Feb 4)

Special tooling enables a standard drilling machine to produce ten different types of cylinder end housings. Simultaneous machining of various faces of three workpieces is described. 1 illustr.

D *Cfb Pr*

How to get more for your cutting fluids dollar

J. J. Obrzut. *Iron Age* 1960 Vol 185 (9) pp 87-102 (Mar 3)

A report in five sections entitled: (*i*) What does a cutting fluid do; (*ii*) Match cutting fluid to the job; (*iii*) How metals influence selection; (*iv*) Tooling: speeds and pressures exert heavy burdens; and (*v*) Care of cutting fluid pays off. 20 illustr.

D *Sjk.21*

New British cutting oil

Plus-Gas Co Ltd. *S Afr Min Engng J* 1960 Vol 71 Pt 1 (3504) p 801 (Apr 1)

Formula 'C' is a harmless non-acid and non-corrosive fluid, whose main constituent is a high grade oil of exceptionally low surface tension. This allows it to penetrate inter-granular crevices in the surfaces of metals being machined, and also to establish a permanent film of fluid between tool and workpiece throughout the operation. Thus, it is claimed, a clean cutting action is assured, while build-up on the cutting tool edge is much reduced. *D* *Sjk.21*

Cutting force dynamometer

A. I. Belousov. *Machines & Tooling* 1959 Vol 30 (11) pp 30-32 (Nov) (Original in Russian)

In the MAI laboratory a two component dynamometer has been made and tested for measuring the cutting forces on lathes, planing and drilling machines. 6 illustr. *D* *Uqg Wgd*

Adaptation of Herbert type 'F' drilling machine

Keelavite Hydraulics Ltd, Meriden Works. *Mach Tool Rev* 1960 Vol 48 (283) p 24 (Jan-Feb)

The Herbert range of all-electric drilling machines comprises ten types—single and multi-spindle, bench or column and turret—augmented by a high-speed tapping machine. This range is said to cover all requirements for drilling, tapping, *etc*, of holes up to 1¼ in. diameter. 2 illustr *D* *Cfb Pr*

Demonstration of Mikron gear cutting machines

Henry Turner Machine Tools Ltd, 58 Upper Tooting Rd, London SW 17. *Machinery, Lond* 1960 Vol 96 (2472) pp 731-735 (Mar 30)

6 illustr. *E* *Ad Ceg Pr*

Designing high-impact phenolic molded parts

M. E. Hull. *Prod Engng* 1960 Vol 31 (10) pp 54-57 (Mar 7)

New rules based on latest industrial experience with fibreglass reinforced phenolic resins are given. Inserts used to provide threaded holes for the assembly of the mould should have a coarse diamond knurl for maximum anchorage. 3 illustr.

K *Bo.21*

Unified method of determining undeformed chip factors in various machining methods

A. O. Etin. *Machines & Tooling* 1959 Vol 30 (11) pp 21-25 (Nov) (Original in Russian)

8 illustr. *E* *Ceq.21*

Last month in Birmingham

Anon. *Watchmaker* 1960 pp 58-63 (Apr)

Mentions latest method of milling wedding rings with diamond tools. 10 illustr.

A *Agz Cfj N*

From start to finish

Anon. *Watchmaker* 1960 pp 66-69 (Apr)

Stratton powder compacts are hand polished. Diamond tools are used for machining. 9 illustr.

A *Az Chm N*

CUTTING & MACHINING OF STONE, ETC

Cutting germanium crystals

General Electric Co Ltd, Semi-conductor Div, Hazel-Grove. *Metal Ind, Lond* 1960 Vol 96 (15) p 290 (Apr 8)

A hydro-pneumatic machine designed for cutting semi-conductor crystals and glass tubes cuts at steplessly variable feed rates from 10 in./hr to 1,000 in./hour. The cutter blade consists of a diamond impregnated or bonded wheel. The spindle may be designed for single or two-speed operation and for single or multiple cutting disks from 6 in. to 4 in. diameter. 1 illustr.

A *Bde Cej Nt*

A clue to lapping irregular surfaces ?

Anon. *Tooling & Prod* 1960 Vol 26 (1) p 57 (Apr); *Ceramic Age* 1960 Vol 75 (3) pp 33-35 (Mar)

A development in the optical industry gives promise of many applications in metalworking when an irregular metal surface needs lapping. Tool wear during 'fining', *ie* the finishing operation just before final polishing, is said to be eliminated by using wire cloth as an abrasive carrier: this is done in the Integrated Surfacing System for grinding glass lenses, developed by American Optical Co and now being introduced in many US laboratories. The system incorporates a throwaway wire cloth disk made of 0.007 in. electro-galvanised steel wire woven to 30 × 30 mesh. The wire is applied between tool faces and lenses. Improved tolerances, reduced fining time and lower costs are other advantages claimed, and uniformity of precision has meant that hardly any lenses have to be reworked. 1 illustr.

D *Bm Chm Pgez*

Ultra high speed grinding

Anon. *Ceramic Age* 1960 Vol 75 (1) p 9 (Jan)

The Ashcombe Industrial Airotor grinds pin holes in ceramic. Used with a diamond burr, it is suitable for opening holes in fired ceramic blocks and tooling designs on glass and ceramics.

A *Bl:Az Chc Nhh*

Centrifugal separators ups diamond wheel life

Anon. *Grinding & Finishing* 1960 Vol 6 (3) p 39 (Mar)

A De Laval Model 115 coolant clarifier installed in the coolant recirculation line of a glass grinding machine is claimed to have increased diamond wheel life by over 50% and to have eliminated a day per month of grinding machine downtime.

See also *Industr Diam Abstr* 1960 Vol 17 p A80 (Mar).

D *Nv Uqe*

The machining of nuclear graphite

S. C. Poulsen. *Machinery, Lond* 1960 Vol 96 (2469) pp 520-531 (Mar 9)

Examples are given of processes for machining typical components for atomic reactors from nuclear graphite. 14 illustr.

K *Bhbz Ceq*

Engineering graphite—production and machining

S. C. Poulsen. *Machinery, Lond* Vol 96 (2474) pp 819-822 (Apr 13)

Details concerning drilling, boring, threading, machining and lapping graphite parts. Most tools used are carbide tipped. 5 illustr.

A *Az Bhb Ceq*

GEM POLISHING

New departures in diamond design

Anon. *Watchmaker* 1960 pp 61-63 (Feb)

9 illustr. *A* *F Hl*

'Fingerprinting' diamonds

R. Webster. *Gemmologist* 1960 Vol 29 (344) pp 56-57 (Mar)

Articles in the *National Jeweller* describe methods for photographing diamond with a Polaroid Land camera and Polaroid copymaker, and secondly a Bruce Eytinge camera, whereby the flaws in stones are accurately recorded. A third method makes use of equipment called the Diascope or Diagraph to project the picture onto a screen which is divided into squares. The number of squares covered by the flaws gives percentage figures by which the stone is identified.

A *F Hz Wcf*

ROCK DRILLING

Principal trends in the work carried out with a view to finding new drilling techniques. Tendances principales de travaux pour la creation d'une nouvelle technique de forage

N. B. Valaev. *Prospection et protection du sous-sol* 1959 (9) pp 13-21 (Sep) (In French, original in Russian)

To meet the needs of the intensified programme of geological research established at the 21st Congress of the Soviet Communist Party, much time is being spent on the development of new drilling equipment. Diamond drills for depths of between 50 and 1,200 m play an important part in this programme. Diamond drilling is said to increase efficiency by at least 1.5 to 2 times and to be more economical. Details of various drills are given and a table gives technical characteristics. 1 illustr, 1 table.

K *Cfb Nh.21.33*

T.V. for diamond drill holes [:] Camera that transmits enlarged picture

Anon. *Diamond News* 1960 Vol 23 (6) p 29 (Mar)

A *Cfb Nh:Az Cz Wcfb*

Notes on the use of coal drill bits with small diamond drills

R. F. Hill. *Chamb Mines (Rhod) J* 1959 Vol 1 pp 24-25 (Oct); *IMM Abstr* 1960 Vol 10 (3) p 95 (Feb-Mar)

Details of the use of rotary tungsten carbide coal drill bits in placing casing and in chrome prospecting are given. The bits have been used with the small Stenslunde diamond drills and X-ray size equipment.

X *Bnu Cfb Nh*

Theoretical and practical considerations of the control of deviation in rotary drilling

G. Salvi. *Industr min* 1959 Vol 10 pp 667-675 (Oct); *IMM Abstr* 1960 Vol 10 (3) p 95 (Feb-Mar) (Original in Italian)

D *Cfbr*

Geological conditions and drilling technique in the deviation of bore holes

K. Grzymalski, E. Kowalski, A. Mizia, W. Prokop. *Przeglad Gorniczy* 1958 (7-8) pp 382-391; *Polish Techn Abstr* 1959 (4) pp 9-10 (Original in Polish)

A *Az.21*

Development at Western Deeps starts this month

Anon. *S Afr Min Engng J* 1960 Vol 71 Pt 1 (3500) pp 525-529 (Mar 4)

As an aid to getting a quick start to development, percussive drills will be used to provide the initial cover against water, instead of diamond drills. It is estimated that this will save some twelve days. 2 illustr.

E *Cfb Nh:Cfbf/Cfbf.361*

USP 2,909,922 (June 6, 1956) **H. H. Haman, Anaconda Co**

Drill testing device

This is a portable device for testing the operating efficiency of percussion-type rock drills. A brake disk is mounted on a supporting plate in a frame. The disk is rotated by the drill to be tested and braked by a brake shoe also mounted on the supporting plate. The force exerted on the support by rotation of the disk reacts against a restraining force applied to a handle on the supporting plate with which a gauge is connected for measuring the pivotal movement. (3 claims, 5 illustr). Ref cited: 5 USP.

J *Pl Uqe.1312.545*

FP 1,186,792 (Nov 28, 1957) **Soc Nouvelle de Sondage 'Bonne Espérance'**

Drilling crowns. Couronnes de forage

The conventional drill as represented in Fig 5 has a cylindrical head 1 with a rim 2 with diamonds embedded therein and a guiding portion 4 also of cylindrical shape. It often occurs that the drill becomes stuck, *eg* because of obstructions in the coolant circuit or because of accumulation of detritus. The drill shown in Fig 6, 7 and 8 has no continuous peripheral surfaces, but channels 5 between projecting cutting portions and guiding ribs ensure good removal

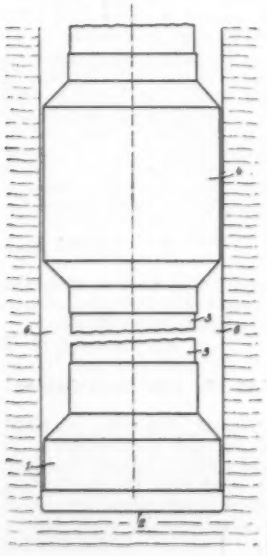


Fig 5. A conventional drill with diamond-embedded rim 2 and cylindrical guiding portion 4. FP 1,186,792.

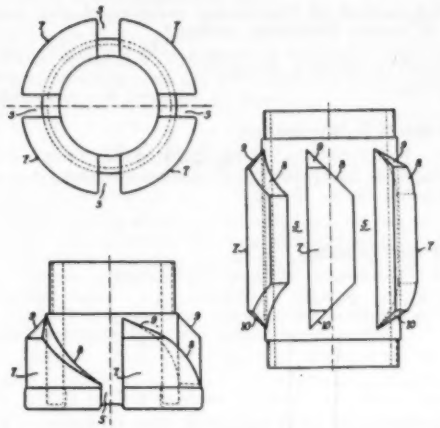


Fig 6 (top, left), 7 (below, left), and 8. Three views of a drill with no peripheral surfaces but with channels 5 ensuring coolant flow and removal of detritus. FP 1,186,792.

of detritus and continuous coolant flow. The projections may be provided with cutting edges 9 in order to overcome obstacles when raising the drill. (4 claims, 5 illustr).

J *Nhg.21.545*

FP 1,187,288 **Christensen Diamond Products Co** (Nov 27, 1957)

Drills and drill crowns. Trépans et couronnes de carottage

Fig 9 and 10 show the cutting portions 3 in the form of spirally arranged wings, which may be studded with diamonds or consist of diamond particles in a bonding material. The wings are separated by channels 4 for the passage of coolant and the removal of debris. The

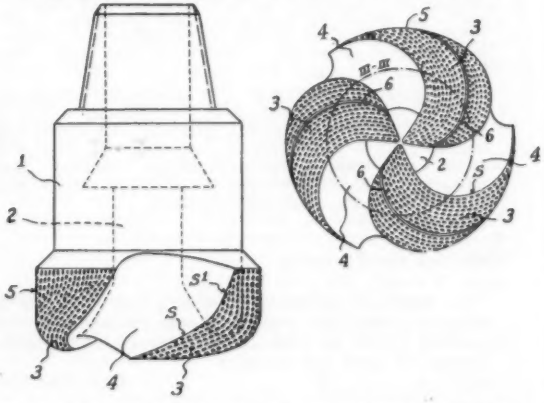


Fig 9 (left) and 10 (above). Diagrams showing arrangement of cutting wings 3 separated by channels 4. FP 1,187,288.

spirals start in the centre line of the drill and may continue along a cylindrical part of the drill 5 in straight lines. The channels are not of a symmetrical cross section but have sharp edges on one side and an inclined wall on the other side. (4 claims, 3 illustr).

J *Nhg.545*

WIRE DRAWING

When to use carbide dies

A. E. Chambers, W. K. Facknitz. *Machinery, NY* 1960 Vol 66 (7) pp 115-120 (Mar)

Among topics discussed is the belief that the maintenance time required for carbide dies is greater than that for steel. This is only partially true. While less material is removed per pass of the diamond wheel in grinding carbide, less stock removal is required in resharpening. The cleaning procedures following the grinding of carbide dies should be duplicated on steel dies. When this is not done, the effects are not as harmful with steel dies as they are with carbide dies. Diamond, the material used to sharpen carbide dies, must be completely removed from the die before it is used. Diamond particles in the grinding wheel tend to embed themselves in the steel parts of the die, not in the carbide, and if these steel portions come in contact with the carbide, the carbide will become abraded or worn away quite rapidly. 5 illustr.

E *Px.138*

Friction and lubrication in engineering production—wire, tube and bar drawing

J. S. Hawkins. *Prod Engr* 1960 Vol 39 (4) pp 226-234 (Apr)

Problems of wire drawing are discussed, both in hot drawing and cold drawing. Die wear is the most important factor. Diamond dies are only used for very fine wire. Different processes and details of production such as reduction of drawing force, heating of the die, bonderizing and lubricants are examined. 11 illustr, 13 ref, 3 tables. *A* *Nkb Unr/Px Unr*

GRINDING AND POLISHING OF CARBIDES AND METALS

Grit size and finish

Anon. *Grinding & Finishing* 1960 Vol 6 (3) p 17-18 (Mar)

Reply to reader's question.

Some of the variables which play an important part in the production of finishes are discussed, including abrasive types, combination of grits and dressing and truing methods. For convenience, grinding operations are divided into two classifications : (*i*) grinding finishes which depend largely on dressing technique and in which grit size is of secondary importance, and (*ii*) finishes resulting entirely from the grit size and natural wheel face breakdown. The first category is by far the largest. Examples of both are given.

D *Vgf*

Interaction of grain spacing and bond content and their effect on grinding

I. F. Havens. *Bull Amer ceram Soc* 1960 Vol 39 (4) p 227 (Apr 15)

Paper given at 62nd Annual Meeting of the American Ceramic Society.

Surface grinding tests were run using a variety of aluminium oxide grinding wheels which had different bond contents and grain spacing. The results of these tests were analyzed to determine the effect of changing bond content and grain spacing upon the amount of metal removed per unit of wheel wear.

X *Chcm.1312*

Grinding techniques for advanced materials

J. A. Mueller. *Bull Amer ceram Soc* 1960 Vol 39 (4) p 227 (Apr 15)

Paper given at 62nd Annual Meeting of the American Ceramic Society.

The effect of the major factors in the grinding process on stock removal and finish are discussed. These factors include wheel speed, work speed, infeed, wheel size, and machine capacity. Emphasis is also directed to the cost of removing stock and producing finish.

D *Bmz Chc.21*

Engineering production research

N. A. Dudley. *Prod Engr* 1960 Vol 39 (4) pp 195-209 (Apr)

Reference is made to the investigations undertaken by the Department of Engineering Production in the University of Birmingham, which covered a wide range of research including broaching, milling, and precision grinding, surface finish measurement, and the effects of the human element in all types of machining. In the precision grinding research, a Churchill horizontal grinding machine was equipped with a special dynamometer and other instruments for recording results. The grinding force, rate of metal removal, and quality of surface finish were examined. 25 illustr, 19 ref.

A *Chc.21*

Gear grinding machines

W. N. Kokitshov. *Sowjet Buchneuerscheinungen Vorankuendigungsdienst* 1960 (6) p 13 (Original in Russian)

Book, Sudpromgis. 320 pp. Price DM 5.50.

The method for setting up gear wheel grinding machines, types of construction and tools are described.

[Not in library of Industrial Diamond Information Bureau]. *A* *Ad Chc Pr.52*

Toolpost grinding machines. Supportschleifmaschinen

Anon. *Industr Anzeig* 1960 Vol 82 (29-30) p 466 (Apr 12) (In German)

For various types of grinding an attachment can be set up on a lathe, honing machine or other machine tool. The grinding wheel is fixed directly to the motor drive and the wheel and flange can be removed from the drive without the two being separated first. The different types of attachment can be had with wheel diameters from 175-400 millemetres. The wheel may be set horizontally or vertically. Speeds of 3,000 rev/min and 1,500 rev/min are reached, depending on the size of the motor. For attachment to lathes for external and internal grinding an auxiliary grinder with indirect drive is used. 2 illustr.

A *Ceqb Pr:Chc Psc*

Close tolerance reaming

H. Sedlik. *Tooling & Prod* 1960 Vol 25 (12) p 60 (Mar)

Holes to within 0.0002 in. or less can be produced by reaming on a production basis under controlled conditions, without the need for subsequent grinding or lapping. This article sets out several basic principles which should be observed if close tolerance reaming is to be successful. 2 tables. *D* *Cel.21*

Grinding split rings

J. M. Breen. *Grinding & Finishing* 1960 Vol 6 (3) p 29 (Mar)

Split rings often need to be ground to finish tolerances on the outer diameter and inner diameter. These operations can be quickly and economically done by means of two fixtures, one of which is illustrated. 1 illustr. *D* *Az Chc*

Production grinder

Olivetti Corp of America. *Tooling & Prod* 1960 Vol 26 (1) p 100 (Apr)

Model R4-300P/Y high precision cylindrical grinder which can be pre-set to grind within 0.000050 in. to a positive stop, has an 8-speed automatically-braked headstock and drives a 16 in. wheel with 4 h.p. motor.

D *Chcl Pr*

Heald Centri-Matic No 090 miniature centreless internal grinder

Heald Machine Co; British rep: Alfred Herbert Ltd, Coventry. *Machinery, Lond* 1960 Vol 96 (2470) pp 611-612 (Mar 16)

Intended particularly for grinding races of miniature ball bearings which may have an external diameter as small as 0.067 in., this machine is automatic in operation, and the various motions are controlled electronically. It is stated, for example, that a tolerance of 0.00015 in., with a surface finish of 5 micro-in. can be maintained on an inner race with a bore diameter of only 0.04 in., and that grinding can be completed in a cycle time of 15 seconds. 1 illustr.

D *Ayz Chc Pr*

Tracer-controlled surface grinder designed to reproduce forms on large workpieces

Gallmeyer & Livingston Co, Grand Rapids, Mich. *Amer Mach* 1960 Vol 104 (6) p 156 (Mar 21)

A tracer controlled hydraulic-feed surface grinder is designed to reproduce transverse forms on large pieces. It can handle forms too large to grind with a single wheel or materials requiring diamond wheels where the cost of formed wheels is prohibitive. The grinder is equipped with automatic cross feed and automatic down feed. Automatic cross feed can be pre-set to feed from 0.008 to 0.040 at each table reversal and has a total travel up to the full width of the worktable. Automatic down feed removes from 0.0025 to 0.060 in./pass and is equipped with an automatic stop. 1 illustr.

K *Chcm Pr*

Surface grinder with automatic down feed

Gallmeyer & Livingston Co, Grand Rapids, Mich. *Grinding & Finishing* 1960 Vol 6 (3) pp 66-67 (Mar)

Incrematic down feed, a new automatic down feed device which permits the operator to pre-set the amount of stock to be removed and which automatically shuts off after stock removal, is now available on all Grand Rapids Saddle Type surface grinders from 6 in. × 16 in. to 24 in. × 48 in. table size. 1 illustr.

D *Chcm Pr*

Fritz Wendt grinding machines for tungsten carbide tools

British rep: Elgar Machine Tool Co Ltd, 172-178 Victoria Rd, London W 3. *Machinery, Lond* 1960 Vol 96 (2473) pp 772-773 (Apr 6)

The type SSR 60 rotary table machine is for surface grinding tungsten carbide and ceramic tips for cutting tools and other items such as wire drawing dies. Type PS 60 is for sharpening tungsten carbide tipped cutting tools with shanks up to 4 in. thick. Both machines have 6 in. diamond impregnated grinding wheels and 6¼ in. vertical adjustment of the wheelhead. Spindle speed is 2,450 rev/min on both. Also available are type PS 50 machine for sharpening cutting tools with shanks up to 2⅞ in. thick, with a 5 in. diameter diamond-impregnated grinding wheel; and type WF 600 incorporating a patented arrangement whereby tungsten carbide tipped tools are sharpened by a diamond impregnated, resin bonded lapping block which is reciprocated horizontally and vertically. Another machine is equipped with a 5 in. diameter cup-type diamond impregnated wheel for grinding chip breaker grooves. 2 illustr.

A *Al Bkc Chc Nv Pr*

Diamond pins

Titan Tool Supply Co Inc, 1419 Hertel Ave, Buffalo 16, NY. *Tooling & Prod* 1960 Vol 26 (1) p 149 (Apr)

A new line of diamond pins is suited for jig grinding, internal grinding of small holes, and many other precision operations. Close tolerances can be achieved at production rates in hardened steel, ceramics, and carbides. 1 illustr.

D *Alz Chcn Nqz Pr*

See while you're grinding

Behr-Manning Co, Troy, NY. *Amer Mach* 1960 Vol 104 (6) p 4 (Mar 21)

A special fibre-backed abrasive disk recently developed has straight sides that cut segments from a full circle, thus giving the operator a partial view of the work while it is being ground.

K *Chc Pez*

Oerlikon bevel wheel lapping machine SKL 1. Oerlikon-Kegelradlaeppmaschine SKL 1

Anon. *Technica* 1960 Vol 9 (8) p 380 (Apr 8) (In German)

This machine is intended for lapping right-angled bevel wheels, with straight or bent teeth, and hypoid gears. It is said to permit the whole tooth surface to be improved after hardening, whatever the size, shape and position of the workpiece. 1 illustr.

K *Ad Chc*

You'll find us at the MUBA. Sine finden uns an der MUBA

Anon. *Technica* 1960 Vol 9 (8) pp 399-402, 407-410, 415-418, 424-426 (Apr 8) (In German)

Among the exhibitors at the Basle fair were Diametal AG who showed examples from their well-known range of 'Superfix' diamond grinding wheels. Eduard Ifanger showed their whole range of tool grinding machines, which can be equipped for sharpening tools of HSS or tools with sintered-carbide inserts. Erhard Doebeli AG exhibited the Kombi-Schliff grinding and lapping machine for lathe tools. 65 illustr.

K *Chc Pr.27.323/Nv.27.323*

New grinding and lapping machine. Neue Schleif- und Laeppmaschine

Anon. *Eurotec* 1960 (7) pp 5-6 (Apr) (In German, abstr in French, English and Italian)

High precision bearings and a special motor with maximum vibrational amplitude of 2 μ are features of the machine. Sharpening and honing may be done without unclamping of the tool. A Kombi diamond grinding head is used, and a special device for grinding chip-breaker grooves is provided. 2 illustr.

A *Chc Pr/Chh Pr*

Machines for internal grinding. Machines à rectifier les intérieurs

Voumard Machines Co SA, La Caux-de-Fonds, Switzerland. *Eurotec* 1960 (7) pp 3-4 (Apr) (In French, abstr in German and English)

Types 6AP (course 900), and 3 AFCH, shown at the Paris and Basle exhibitions, are described. 2 illustr.

A *Chcn Pr*

REQUESTS FROM AMERICA

American readers who wish to order a photostat or reprint of an article abstracted in Industrial Diamond Abstracts are advised to apply directly to the appropriate journal if this is an American publication.

BP 818,163 (July 16, 1956) **L. A. Turner, Gear Grinding Co Ltd**

Gear wheel tooth testing or shaping apparatus

The testing apparatus operates with a principal slide imparting angular movement to the workpiece holder by linear movement of the slide, and two sub-slides—one movable at right angles and the other parallel to the principal slide. The sub-slides are inter-connected. One tracer is in contact with a tooth, the other with a template. When moving the principal slide the tracers traverse tooth and template. The tracer traversing the tooth is also connected with a measuring instrument: movement of the dial hand of instrument indicates an irregular tooth profile. The apparatus may be adapted for shaping the templates of a diamond profile truing device, in which case a motor and a grinding wheel take the place of measuring instrument and tooth profile tracer of the testing arrangement. (4 claims, 5 illustr). *J* *Ad Cz Psc:Chc Pr.545*

USP 2,909,945 (Nov 14, 1956) **C. F. Bonham, Fada Radio & Electric Co Inc**

Roll mechanism for tool dressing machine

A roll mechanism for roll forging a tool bit is the subject of USP 2,832,236 and the present specification describes an improvement on this mechanism. The tool bit is held in a die against the forging roll at the end of a piston hydraulically pressed towards the bit. The roll is attached to the piston by arms to permit a swinging movement at right angles to the piston axis. This swinging movement providing the roll forging action for dressing [sharpening] the bit is produced by a piston, mounted at right angles to the axis of the first piston, moving in a hydraulic cylinder pivotally connected to brackets of the main body of the machine. (6 claims, 4 illustr). Ref cited: 2 USP.
J *Al Chc Pr.545*

DAS 1,068,578 **L. O. Carlsen, E. D. Dammert, Gleason Works**
(Aug 24, 1953—conv date, USA)

Grinding machine for grinding tools, in particular gear wheel milling cutters. Schleifmaschine zum Schaerfen von Werkzeugen insbesondere Zahnradfraesern

The machine is of the type having an oscillating grinding head with a conical grinding wheel whose axis of rotation is arranged at an acute angle to the axis of oscillation. The grinding head is mounted for oscillation in a rotatable support adjustable on the machine frame about an axis at right angles to the axis of oscillation. The support carries a diamond truing device operative when the grinding head is in indexing position. (9 claims, 21 illustr). Ref cited: 1 GP; 3 DBP; 1 USP.
J *Al Chc Pr.545*

MACHINING DEVELOPMENTS

Spark machining of matrices saves time before forging. L'usinage des matrices par étincelage économise du temps avant le forgeage

G. Cany. *Machine-Outil Française* 1960 Vol 25 (153) p 193 (Apr) (In French)
3 illustr. *K* *Ceqm*

Use of electron beams to cut and weld

Anon. *Times* 1960 (Apr 22)

Electrons penetrate only a small distance into solid materials and the release of heat takes place only near the surface. The beam can not only be concentrated onto a small area, less than an hundredth or even a thousandth of an inch, but can also be diverted so as to trace out a path set for it. A disadvantage is that an electron beam must be used in a high vacuum and this limits the size of objects to which the technique can be applied at reasonable cost. These factors must be taken into account when considering the use of electron beams for cutting. It is unlikely that electron beam heating will ever be applied to the cutting of holes in thick materials but, within the scale of work for which it is suited, it enables operations which were previously difficult or impossible to be carried out quickly and accurately. Among applications described here is the drilling of bearing holes in watch jewels.
D *Bbz Cfbz*

The application of a new electrolytic process to precision grinding and glazing machines. Application d'un nouveau procédé électrolytique aux machines d'affûtage et de glaçage de précision

Anon. *Mécan Élect* 1960 Vol 44 (129) p 29 (Jan) (In French)

The Eleform process has been developed whereby grinding is carried out by passing a current of up to 100 amp/sq. cm between the workpiece and a special rotating metallic disk covered by a thin film of special machining liquid. The latter is a solution of salts in water constituting an electrolyte. Numerous advantages are claimed for the process, used on Agathon grinders, including the replacement of the traditional diamond wheels by a special metallic disk. 2 illustr.
K *Chcr.1456*

Microminiaturization of electronic equipment

G. W. A. Dummer (Royal Radar Establishment, Malvern). *Research, Lond* 1960 Vol 13 (5) pp 187-192 (May)

Methods of fabricating microminiature electronic assemblies are described. In the case of microminiature circuits, the first stage is preparation of a glass substrate to the correct size. After cleaning the plate, holes are drilled ultrasonically for the insertion of the miniature transistors. 9 illustr, 1 table.
D *Ahz Ceqr*

Spot news

DoAll Co, Des Plaines, Ill. *Metalworking Prod* 1960 Vol 104 (17) p 5 (Apr 27)

An arc produced between a special bandsaw and honeycomb is the latest way of slicing the material. As the fast moving knife-edge approaches the honeycomb, its arc locally melts the foil sections; water jets promptly quench the molten metal. Honeycomb ⅜ in. thick is slit at 50 sq. in./minute.
D *Bfa Cejz*

Out of the melting pot: purifying anneal

Anon. *Metal Ind, Lond* 1960 Vol 96 (16) p 306 (Apr 15)

After further development, the cavitation machining process could prove as efficient as spark erosion and ultrasonic machining. A method has been developed in Russia for forming a high speed (400-600 m/sec) jet of liquid of small cross section, *eg* nozzle diameter of 1 mm or less. Experiments, which have so far failed to produce conclusive results, are discussed.
K *Ceqm*Ceqr*Ceqz*

USP 2,909,641 (May 2, 1958) **C. J. Kucyn, Republican Aviation Corp**

Tool for electro-shaping

A tool with a contoured and complex working face, which has to be reshaped frequently because of wear, is expensive to make and to maintain when machined and hand finished in the usual way. These drawbacks have been overcome by providing a stack of pins 11, side-by-side as shown in Fig 11, which are pushed into the

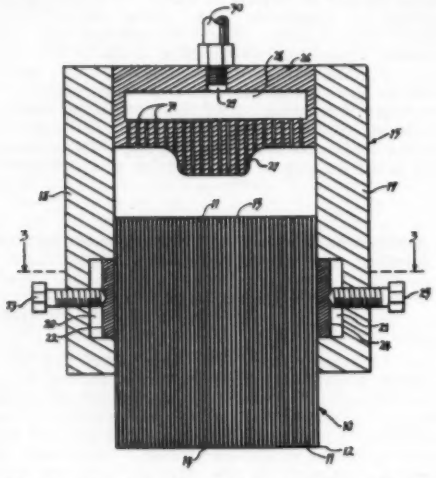
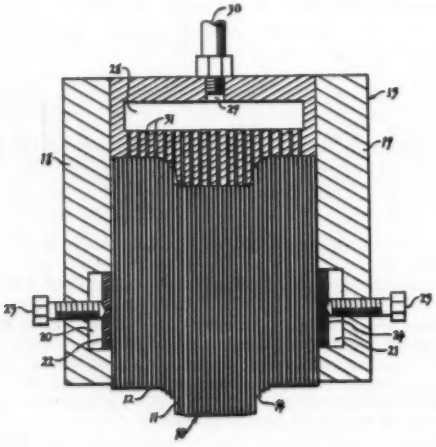


Fig 11 (above). A stack of pins 11 shown side-by-side.

Fig 12. The pins when pushed into the desired form and clamped in position. USP 2,909,641.



desired form by a die 26 with contoured surface 27 as in Fig 12. The pins are then clamped in position. Holder 15 is a box-like frame into which dielectric fluid is forced through coupling 30 and between the pins to the working face 14 of the tool. (12 claims, 4 illustr). Ref cited : 3 USP. *J* *Pd Qc.545*

LITERATURE REQUESTS
Please quote the page number of the journal which contains the original reference, and the author and title of the article, in all cases.

BP 819,267 (July 12, 1956) **E. H. Carman, Birmingham Small Arms Co Ltd**

Spark-machining

The usual method of spark machining is the 'non-contact' method in which the end face of the electrode is automatically maintained at the required distance from the face of the workpiece by a servo-mechanism operated by some parameter of the spark-discharge current. Less widely used is the 'contact' method in which either workpiece or electrode is vibrated in the direction of penetration to cause periodic contact. The electrode is automatically fed to compensate for electrode consumption and for removal of metal from the workpiece. The method described in this specifications does not use any controlled mechanism for feeding the electrode towards a vibrated workpiece. Instead, the electrode is constantly urged, *eg* by its weight, towards the workpiece which is vibrated at such an amplitude that the electrode bounces off thus producing a spark gap. This method requires less power for vibrating the workpiece, results in a high rate of cutting, and is of special advantage when drilling fine holes. (13 claims, 16 illustr).

J *Ceqm Ptc.545*

FP 1,187,496 **Wickman Ltd**

(Dec 5, 1956 ; Nov 21, 1957—conv date, Gt Britain)

Method of drilling metals by electric discharges. Procédé de forage de métaux par décharge d'étincelles électriques

When drilling small holes, a tubular drill is used through which a continuous and controlled stream of dielectric fluid is forced into the gap between the operative end of the electrode and the workpiece whereby the electrode passes a guide arranged adjacent to the workpiece. The electrode may be rotated and workpiece and electrode may be vibrated in the direction of the longitudinal axis of the electrode. (3 claims). *J* *Bf Cfbg.545*

Swiss P 340,923 (Sep 14, 1957) **W. Buhrer, Ateliers des Charmilles SA**

Machine for electrolytic machining. Machine à usiner électriquement

The correct working of a machine having a rotary disk as electrode is dependent on an uninterrupted feed of the electrolyte. This may be endangered by impurities, metal particles removed with the progress of the work, *etc*, so that the continuous circulation of liquid is stopped. If damaged, the disk would require regrinding as precision work can only be carried out if the disk rotates in a perfect plane ; to avoid such damage, a switch is provided in the liquid circuit which interrupts the electric current when the liquid flow stops. (5 claims, 2 illustr). *J* *Ceqh Pr.545*

PRODUCTION, GRADING & RECOVERY OF ABRASIVE PARTICLES

Diamond reclamation

Anon. *Amer Mach* 1960 Vol 104 (6) p 2 (Mar 21)

A 9% increase in the reclamation of fine diamond particles from machine wiping cloths, at lower cost, is claimed to be made possible by a new technique developed at Springfield Armory. After washing in standard washing machines provided with a wire mesh screen over a false bottom, the residue undergoes a purifying process of which details are given.

K *Hw*

Abrasive compounds in barrel finishing

A. S. Kohler. *Plating* 1960 (Jan); abstr *Prod Engng* 1960 Vol 31 (10) p 88 (Mar 7)

Discusses the two primary types of deburring compounds—those with and those without abrasive grains. It describes the effects of particle size and tells how particles are reduced in size during barrel finishing. Uniformity of size, toughness of the grains, and relative advantages and disadvantages of various types of grain are also covered. *K* *Rdc Vgf/Rdc.21*

Abrasives : natural and synthetic

L. J. Beaudin. *Bull Amer ceram Soc* 1960 Vol 39 (4) p 227 (Apr 15)

Paper given at 62nd Annual Meeting of the American Ceramic Society.

The particular properties of natural abrasives such as tripoli, silica-stones, garnet, emery, corundum, and diamond are discussed in relation to their ultimate uses. The composition and physical properties of the three most important synthetic abrasives, aluminium oxide, silicon carbide, and diamond are discussed in detail. The usefulness of certain other hard materials such as boron carbide is considered and some thought is given to the possibility of a 'universal' abrasive.
D *Rd U*Rdf U*

New revised edition of the 'VDI regulations for determination of particle size in technical dusts'. Neue ueberarbeitete Auflage der 'VDI-Richtlinien Feinheitsbestimmungen an technischen Staeuben'

R. Nagel. *Staub* 1960 Vol 20 (4) pp 109-112 (Apr 1) (In German, abstrs in English and French)

Review of the revised edition stressing that in future comparison between analyses made by different laboratories will be easier, and that calculations should be avoided where measured values are more useful and clearer. An example shows the advantages obtained by observing the regulations. 3 illustr, 3 ref, 5 tables.
A *Vgf*

TOOL PRODUCTION

The orientation of diamonds for tools by means of an X-ray image intensifier

J. F. H. Custers, A. J. van der Wagt. *Philips tech Rev* 1959/60 Vol 21 (6) pp 178-179 (Mar 15)

In order to make the best use of the exceptional hardness of diamonds for tools and dies, correct orientation must be found. The orientation will vary according to whether the greatest threat to the stone is wear or cleavage. X-ray diffraction is used to determine the space lattice of diamonds, but recently a quicker method has been discovered : a method using the X-ray image intensifier, which enables the direct visual observation of the Laue diagram. The diamond is fixed to a goniometer head which is moved until the desired spot pattern is seen on the viewing screen. A special set-up enables the diamond to be transferred from the goniometer to the holder in which it is to be set, keeping the correct orientation. 2 illustr.

See also *Industr Diam Abstr* 1960 Vol 17 p A82 (Mar).
A *F Ubc Uklb*

Developments in machine tool design to keep pace with electronics and numerical control

H. Ogden. *Mach Shop Mag* 1960 Vol 21 (4) pp 195-206 (Apr)

13 illustr. *D* *Pr Qb.132*

Flank wear on a sintered oxide tool bit

A. Gibson. *Machinery, Lond* 1960 Vol 96 (2476) pp 933-936 (Apr 27)

During an experiment with sintered aluminium oxide cutting tools, a film or layer of material was observed on the tool flank immediately below the cutting edge. This layer was welded firmly to the tool flank and obscured the true wear land. After the layer was removed by etching, the true flank wear was found to be only a fraction of the apparent flank wear. Despite conflicting reports, it is apparent that, under certain conditions, welding can occur and chemical reactions take place, between sintered oxide tool bits and certain workpiece materials. 4 illustr, 15 ref.
X *Pd Rj Unr*

Metal cutting [:] Savings may be impressive with proper style of tool

Wesson Cutting Tools. *Canad Mach* 1960 Vol 71 (2) p 111 (Feb)

Six-months study compares the relative economics of carbide tips in flat, slug, throwaway designs. 1 table.
X *Bf Ceg Pdc*

Chip producing machine tools. Spanende Werkzeugmaschinen

A. Schatz. *Werkst u Betr* 1960 Vol 93 (4) p 221 (Apr) (In German)

Book, Alfred Koerner Verlag, Stuttgart. 1959, 185 pp, illustr. Price DM 12.--. (In German).

The fundamentals of machine tool structure are explained in the first part of the book. In the later chapters various types of operations on the machines are described.

[Not in library of Industrial Diamond Information Bureau]. *A* *Pr Qb.52*

How to double your life . . . and still have the advantages of positive rake

Anon. *Tooling & Prod* 1960 Vol 26 (1) p 62 (Apr)

A development that should save a high percentage of the present cost of inserts is accomplished by simply grinding positive rake chipbreaker grooves in negative rake inserts. The method is applied to carbide throwaways. 2 illustr. *D* *Pdcb*

Production potentialities, state of development and economic importance of ceramic cutting materials. Leistungsfaehigkeit, Stand der Einfuehrung und wirtschaftliche Bedeutung der Schneidkeramik

E. Gimbott. *Fertigungstechnik, Berl* 1960 Vol 10 (4) pp 212-216 (Apr) (In German)

5 illustr, 15 ref. *A* *Pdd.21*

Ceramic tools outperform

Gulton Industries Inc, Metichen, NJ. *Iron Age* 1960 Vol 185 (2) p 9 (Jan 14)

A new ceramic cutting tool, cold pressed from aluminium oxide, is said to have out-performed carbides by as much as 600% in length of life. Speeds and shock resistance are higher and the new tools are believed to be the first ceramics suitable for rough and interrupted cuts. *D* *Pdd Uqe*

Development trends in tool standardization. Entwicklungstendenzen der Werkzeug-Standardisierung

W. Niedballa. *Fertigungstechnik, Berl* 1960 Vol 10 (3) pp 124-129 (Mar) (In German)

The form of any cutting tool for metal working is determined by the basic theory behind standardization as well as by the latest stage of development reached in machining technique. 9 illustr, 6 ref.
A *Bf Ceg Pd.21*

Cutting tools—carbide selection for machining jet space alloys

D. G. Jones. *Mach Tool Blue Bk* 1960 Vol 55 (3) pp 105-107, 109 (Mar)

Discusses the problems involved in selecting carbides for machining alloys, with particular emphasis on the new 'jet space-age' alloys now in use. A grade selection procedure is presented together with a list of general principles. 1 table.

E *Bfxz Ceq Pdc.18*

Brazed-tip and clamped-tip tools

Anon. *Machinery, Lond* 1960 Vol 96 (2470) pp 575, 630 (Mar 16)

D *Pdcb*

FP 1,184,830 **Wagner & Englert GmbH**
(Oct 22, 1956—conv date, Germany)

Grinding wheel and its method of manufacture. Meule et son procédé de fabrication

The wheel is made up of three parts : an outer annular part which is the full width of the wheel, and two identical inner parts of an exterior diameter equal to the interior diameter of the outer annulus, but each about half the width of the outer part and separated by a parting layer. The outer annulus contains an abrasive mixture as used for wheels of larger diameter ; the inner parts contain an abrasive mixture as used for smaller wheels. When the outer annulus has been worn away to expose the parting layer the wheel can be divided into the two smaller wheels, whereas previously such a wheel had to be discarded. (5 claims, 2 illustr).

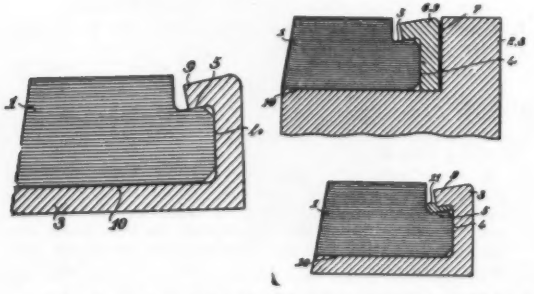
J *Pe Qc.545*

FP 1,184,883 **H. Heinlein**
(Oct 20, 1956—conv date, Germany)

Device for securing cutting bits on cutting tools. Dispositif de fixation des plaquettes coupantes d'outils de coupe

Cutting bits of carbide or other hard metal are usually secured by brazing which can affect the hardness of the bit and cause tensions and fissures in it, so that one bit may become unusable prematurely. Furthermore, a diamond wheel grinding the bit will become loaded with the brazing compound and lose its cutting power.

Fig 13 (below), 14 (top, left), and 15. Cross sections of the idea in practice. FP 1,184,883.



It has been found that the bit can be securely held by a ledge on a small intermediate thin plate which may be brazed or clamped to the tool holder body. Fig 13, 14 and 15 show cross sections of several embodiments of the main idea. Bit 1 is resiliently held under ledge 9 of plate 6 brazed to tool holder 2. In Fig 15 an elastic part 11 is set between ledge 9 and bit 1 : a design recommended for securing ceramic bits. (18 claims, 19 illustr).

J *Pdc Qc.545*

Swiss P 341,088 **W. H. Bateman, Wickman Ltd**
(May 24, 1954 ; May 11, 1955—conv dates, Gt Britain)

Method of forming a helical working face on a grinding wheel serving for grinding gear wheels according to the generating principle, and machine for carrying out the method. Verfahren zum Formen einer einen schraubenlinienfoermigen Verlauf aufweisenden Arbeitsflaeche einer Schleifscheibe, die zur Bearbeitung von Zahnraedern und dergleichen nach dem Abwaelzverfahren dient, und Maschine zur Durchfuehrung des Verfahrens

The grinding wheels used hitherto for this purpose are similar to wheels used for grinding threads. The new method is characterized by a rotatable tool of a profile corresponding to the profile to be ground by the wheel. Fig 16 and 17 show a front view and a side view of a machine for profiling grinding wheel *i*. Wheel *i* is clamped on spindle *j* of gear wheel *e*. A controlling wheel *m* is positioned on parallel spindle *k* which also serves for mounting swing arm *c* adjusted by screw *h*.

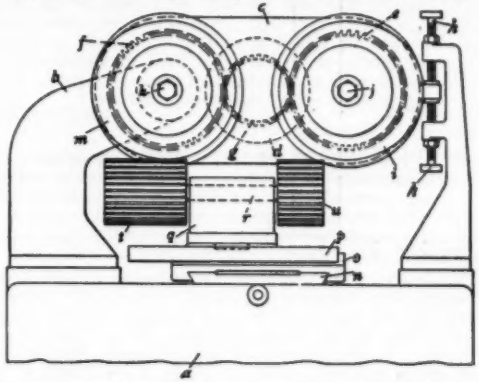
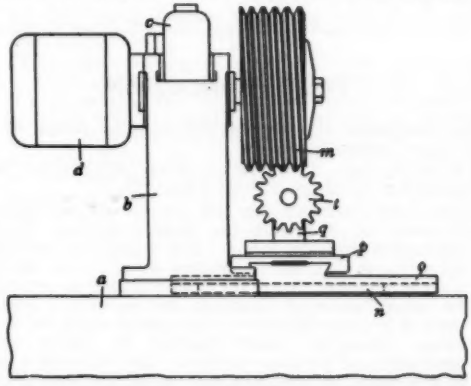


Fig 16 (above), and 17. Front and side views of a machine for profiling grinding wheel i. *Swiss P 341,088.*



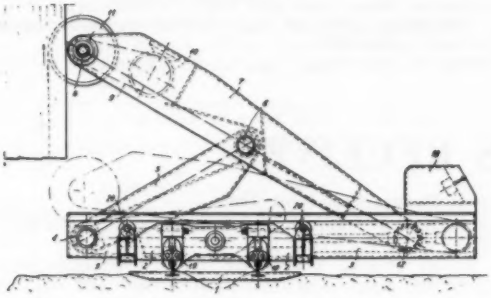
The helical teeth of wheel *m* are of the exact shape to be imparted to the grinding wheel *i*. A carriage *o* is slidable parallel to spindles *j* and *k* and on this carriage slides another carriage *p* at right angles to *o*. A third spindle is mounted on carriage *p* with two toothed wheels, *ie* tool wheel *u* and controlling wheel *t*. Tool wheel *u* may be made of tungsten carbide or may have a working face of diamond grains embedded in a matrix. Synchronized reciprocating movements or feed movements can be produced independently after adjustment of arm *c* to obtain required depth of the teeth in wheel i. (4 claims, 4 illustr).

J *Abmd Cg.545*

FP 1,187,798 (July 30, 1957) **J. Vial, Soc Technique pour l'Industrie Minière**

Slitting machine with diamond disk. Rouilleuse à disque diamanté

The machine is particularly adapted to making vertical incisions in vertical walls when driving galleries in mining operations. Diamond disks or thin milling cutters employed for this purpose are usually mounted on a carriage guided on rails. This guide however is difficult to maintain because of abrasive dust and the coolant used for the disks, so that rapid wear of the guides and premature destruction of the disks occur.



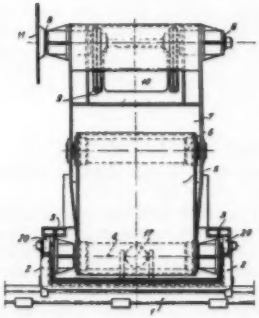


Fig 18 (above) and 19. The new machine showing disk 11 mounted at the end of frame 7, which forms a lever system with arms 5. FP 1,187,798.

In the new machine, as represented in Fig 18 and 19, the disk 11 is mounted at the end of a frame 7 linked to a base 3 travelling on rails. The frame forms a lever system with arms 5, so that when shaft 12 is moved hydraulically towards the pivots 4 of arms 5, disk 11 is raised, cutting a slot in the direction of the arrow. As all moving parts are well protected and the base 3 on its rails is stationary during cutting, the disk is always correctly guided and no premature destruction need be feared. (4 claims, 3 illustr).

J *Cej Nt Pr.545*

DAS 1,069, 026 **R. Holer**

(July 23, 1953—conv date, France)

Method of making grinding tools. Verfahren zur Herstellung von Schleifwerkzeugen

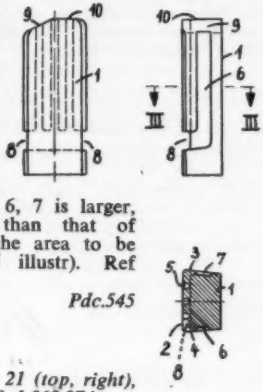
A layer of tin is electrolytically applied to a metallic base. Metal carbide grains are soldered into this layer. The base on which abrasive grains are soldered is then electrolytically covered with another metal layer which has a melting point higher than that of tin, *eg* copper, and both layers are then heated to a temperature at which alloying takes place. (2 claims). Ref cited: 2 DBP; 1 GP; 1 Swiss P; 1 BP; 2 USP.

J *Pe Qc.545*

DAS 1,068,974 (Apr 9, 1958) **H. Lindemann, Th Calow & Co**

Cutting tool preferably of sintered carbide. Schneidkoerper vorzugswe'se aus Hartmetall

The tool is characterized by grooves to convey coolant to the cutting edges. Fig 20, 21 and 22 are representations of the cutter with its plane upper face 1 and grooves 5, 6, 7 on its under face and its side faces connected by a recess 8. The width of grooves 6, 7 is larger, their depth smaller than that of grooves 5 to reduce the area to be ground. (4 claims, 5 illustr). Ref cited: 1 DBP.



J *Pdc.545*

Fig 20 (top, left), 21 (top, right), and 22. DAS 1,068,974.

POWDER METALLURGY

New cutting tool composition

Anon. *Precision Metal Molding* 1960 Vol 18 (1) p 42 (Jan); abstr *Metal Powd Rep* 1960 Vol 14 (6) pp 103-104 (Feb)

A *Pd*

Carbides in high speed steels. I carburi negli acciai rapidi

J. Lomas. *Macchine* 1960 Vol 15 (3) pp 233, 235, 237, 239, 241, 243 (Mar) (In Italian)

M *Pdb Rg*

Sintered aluminium inserts

H. Kessler. *Metal Ind, Lond* 1960 Vol 96 (16) pp 321-324 (Apr 15)

12 illustr. *K* *Pdz Rj*

MISCELLANEOUS

British machine tool imports and exports (classified): Exports of new machine tools and parts during December, 1959

Anon. *Machinery, Lond* 1960 Vol 96 (2476) pp 970-971 (Apr 27)

2 tables. *D* *Pr.251.321*

Modernize now for 1970

Anon. *Metalworking Prod* 1960 Vol 104 (15) pp 657-662 (Apr 13)

Specific examples are given of the way in which productivity of machine tools has increased during the past twenty years. 3 tables. *D* *Pr.25*

Analysis of cutting force . . . a work-energy approach
H. Heinmann. *Tool Engr* 1960 Vol 44 (3) pp 101-104 (Mar)

Cutting force and horsepower for machining operations can be quickly calculated for any material for which the shear angle and the ultimate shear strength of the material are known. This method is discussed in some detail. 4 illustr, 1 table. *E* *Uqg.21*

Short cut to machinability determination
A. Ashburn. *Metalworking Prod* 1960 Vol 104 (13) pp 568-570 (Mar 30)

With a few short cutting tests and this mathematical approach, it may be possible to solve machinability problems in a fraction of the time needed for complete tool life testing. 2 illustr. *X* *Unp.21*

Freezing movement of an X-ray picture
R. Meakin. *New Scientist* 1960 Vol 7 (178) pp 924-926 (Apr 14)

The techniques described here for 'freezing' the motion of moving parts in X-ray photographs were developed largely for armament research, but should have many general engineering uses. Main difficulties are in the design of suitable X-ray tubes and electrical pulse generators. 4 illustr.
X *Wcfd.256*

CORRIGENDUM

See Industr Diam Abstr 1959 Vol 17 p A113 (Apr)
Percussion drill bit and method of producing it (USP 2,902,259) 2
For 'C. W. Tilden' read 'C. V. Tilden'.

PUBLICATIONS RECEIVED

BOOK REVIEWS

Introduction to crystallography. Einfuehrung in die Kristallographie
W. Kleber. VEB Verlag Technik, Berlin. 1959, 3rd ed, 332 pp, illustr, indices. (In German)

The third edition has been brought up to date and expanded. In particular, additions have been made concerning cast, hypermorphy and exoelectrons. Besides these special fields, the subject is studied in detail with the help of excellent diagrams and photographs, and the text is set out under clear subject headings. It is a work for the serious student and is used in German universities. *A* *Vh.52*

General crystallography—a brief compendium
W. F. de Jong. W. H. Freeman & Co, San Francisco. 1959, 281 pp, illustr, indices

Until recently, crystallography was usually considered as a subdivision of minerology, and was in general confined to descriptive work on the outer form and habit of crystals, and to the study of crystal optics. Laue's discovery of the interference effects shown by X-rays on their passage through crystals and subsequent developments have made it an important part of physics, equal in importance, for example, to thermodynamics.

This book is a review of the whole domain of crystallography with emphasis on the role of symmetry. The author divides the subject into four parts: geometric, structural, chemical, and physical. Although not primarily a text book, the literature cited has been chosen in such a way that it may be used as a guide in private study; in addition, it will serve students as a summary of the modern view of crystallography. The book is abundantly illustrated and has both name and subject indices. *E* *Vh.52*

Metal Industry Handbook and Directory 1960
Iliffe & Sons Ltd, Dorset Hse, Stamford St, London SE 1. 568 pp, tables, indices. Price 21s

Again the Metal Industry Handbook is full of useful information for all concerned with the general field of metallurgy. Containing a comprehensive series of tables and general data, it also includes a list of proprietary alloys, British Standard Specifications, a directory including trade names, scientific and technical institutions and associations, and a buyers' guide.
E *Bf.25.52*

British Plastics Year Book 1960
Iliffe & Sons Ltd, Dorset Hse, Stamford St, London SE 1. 692 pp. Price 42s

British Plastics Year Book 1960, a comprehensive reference book of the industry, is well laid out for quick and easy reference, each section being prefaced by a tabbed card. Not only does it include sections covering materials, plant and equipment, and manufactured products, but also names and addresses of firms and consultants at home and abroad, who's who in the plastics industry, and a section on technical and general data. *E* *Bp.52*

Cutting tools, jigs and fixtures
H. C. Town. Odhams Press Ltd, Long Acre, London. 1960, 247 pp, illustr, indices. Price 25s

Steady progress has been made in cutting tool practice during recent years: this book presents the latest developments and includes many practical examples. The chapter on cutting materials includes both ceramics and diamonds. Part I deals with basic features of tool design while Part II discusses the economics and design factors of jigs and fixtures and compares different machining methods. A useful feature of the book is the set of worked examples of design problems, which will be helpful to those engaged in designing or using cutting tools in conjunction with jigs and fixtures as well as to students. *E* *N.52/Pdd.52*

TRADE LITERATURE

Catalog No 359—Adamas tungsten carbide
Adamas Carbide Corp, Kenilworth, NJ. 31 pp, 8½ × 11 in., illustr

This is a comprehensive catalogue of the Adamas range of tungsten carbide throwaway inserts, tool holders, brazed type tools, mechanically held blanks and standard blanks. Exhaustive data sheets are included. A new premium grade carbide, Grade 639, slightly harder than Grade 548, is recommended for light cuts on high alloy steels in good rigid set-ups, but is available as standard only in negative rake throwaway inserts. *K* *Pdc.57*

PATENT LISTS

BRITISH

The Official Journal (Patents) 1960 (3712) (Apr 6)

836,128 FERNSEH GmbH. Machine for drilling very fine holes.

836,479 MYFORD ENGINEERING CO LTD. Method of mounting the slide in grinding wheel dressing apparatus and for like purposes.

835,989 CINCINNATI MILLING MACHINE CO. Centreless grinder.

836,182 ZEISS-STIFTUNG, C. [trading as ZEISS, C. (Firm of)]. Method and device for working materials by means of a beam of charged particles.

The Official Journal (Patents) 1960 (3713) (Apr 13)

836,591 MINNESOTA MINING & MANUFACTURING CO. Moulded abrasive wheels and methods of making them.

836,883 ENGINEERING DIAMONDS LTD, and ALLEN, R. Means for truing or dressing of grindstones and like circular cutting tools.

837,013 MORGAN CRUCIBLE CO LTD. Material for cutting tools.

837,262 HACK, K. Apparatus for the automatic setting of the truing tools for the grinding disks of spring-end grinding machines.

The Official Journal (Patents) 1960 (3714) (Apr 21)

837,942 SHEFFIELD CORP. Surface treating apparatus for grinding wheels or the like.

The Official Journal (Patents) 1960 (3715) (Apr 27)

838,066 MINNESOTA MINING & MANUFACTURING CO. Contact wheels for grinding and abrading apparatus.

838,380 MICROMATIC HONE CORP. Honing device.

838,887 ARMSTRONG SIDDELEY MOTORS LTD. Machine for polishing or grinding elongate workpieces.

838,035 DE BEERS CONSOLIDATED MINES LTD. Polishing hard crystalline carbon.

838,575 WESTERN ELECTRIC CO INC. Method of growing corundum crystals.

838,283 GENERAL ELECTRIC CO. Methods of manufacturing photograph styli.

UNITED STATES

Official Gazette 1960 Vol 752 (1-5) (Mar)

2,926,464 R. A. SURERUS. Automatically-regulated precision-ball processing machine.

2,926,466 E. R. DUNN, GARDNER MACHINE CO. Gauge for setting abrasive disks.

2,926,467 A. L. KRAUSE, G. N. LEVESQUE, BROWN & SHARPE MFG CO. Fine feed distortion arrangement for grinding machines.

2,926,469 L. M. KUBSH, GARDNER MACHINE CO. Abrasive disk and method of making it.

2,926,651 H. E. BALSIGER, LANDIS TOOL CO. Abrasive wheel forming and dressing apparatus.

2,926,652 L. DUNCAN. Grinding wheel dressing.

2,926,653 F. S. KRAFFT, THOMPSON GRINDER CO. Grinding machines.

2,926,654 H. C. JOHNSTON. Grinding wheel dresser.

2,927,405 F. GUZOWSKI. Contour grinder.

2,927,505 H. B. HAANSTRA, NORTH AMERICAN PHILIPS CO INC. Microtome.

2,928,528 R. M. KELDAY, F. L. HAYDEN, STEEL CO OF CANADA. Wire-drawing die.

2,929,172 J. H. PASELL, VAN NORMAN IND INC. Machine for cutting a succession of workpieces to a predetermined size.

2,929,176 J. W. McAULEY, E. L. KARLENE, LIBBEY-OWENS-FORD GLASS CO. Method and apparatus for surfacing glass sheets.

2,929,240 I. W. BORGER, J. M. HUBER CORP. Apparatus for testing materials for wear resistance.

2,929,612 F. L. LE BUS sen, LE BUS ROYALTY CO. Telescoping core drill.

2,930,111 L. J. ST. CLAIR, ADAMAS CARBIDE CORP. Tool holder.

2,930,130 S. E. RAY, M. L. RAY. Optical lens scriber.

2,930,167 R. S. HAHN, HEALD MACHINE CO. Grinding machine.

2,930,169 A. MOHRENSTEIN. Device for balancing grinding wheels during rotation.

2,930,371 E. V. FLANDERS, JONES & LAMSON MACHINE CO. Grinding wheel dressing device.

2,930,372 N. HOGLUND. Contour forming apparatus.

2,930,373 W. F. JESSUP, R. H. WEISGERBER, CINCINNATI MILLING MACHINE CO. Grinding machine truing mechanism.

AUSTRALIAN

Official Journal 1960 Vol 30 (3-7) (Feb-Mar)

226,337 J. VAN TILBURG. Diamond from graphite.

SWISS

Patentliste 1960 (2-4) (Jan-Feb)

344,146 M. J. HARRIS, G. K. N. GROUP SERVICES LTD. Machine for working by electro-erosion.

344,492 H. AXER, BETEILIGUNGS- UND PATENTVERWALTUNGSGES mbH. Device for controlling the feed of the electrode for the electro-erosive machining of metals.

344,634 R. LUESCHER. Tool grinding machine.

344,635 H. MODLER, ASCHAFFENBURGER MASCHINENFABRIK J. MODLER. Device for the centreless grinding of the enveloping surface of convex rolls.

344,636 R. A. MAHLMEISTER, CIMATOOL CORP. Method and device for machining the profiles of a plurality of profiled workpieces in one operational cycle.

344,954 W. BLOESCH. Method of making a dial and dial produced by the method.

FRENCH

Bulletin Officiel 1960 Vol 1 (9-13) (Mar-Apr)

1,223,725 O. MUHLSCHLEGEL, AVOG ELECTRO-UND FEINMECHANIK GmbH. Method and device for grinding.

1,224,109 SA LA SOUDURE ELECTRIQUE LAN-GUEPIN. Method and device for engraving continuous surfaces by electro-erosion.

1,224,127 J. LINDIG, H. FISCHER, VEB GROSSDREH-MASCHINENBAU. Machine for grinding the involute flanks of teeth.

1,224,464 A. ERNST. Apparatus for hardness measure-ments, in particular for metals.

1,224,481 GEAR GRINDING CO LTD. Mechanism for profile truing gear grinding wheels.

1,224,927 WERNICKE & CO KG. Grinding machine, in particular for spectacle glasses.

1,225,166 P. G. F. CAMARD. Glass cutting apparatus.

1,226,323 M. FERRAND. Method of producing abrasive surfaces by electro-deposition and product obtained thereby.

1,225,496 G. J. LELKES. Method of producing pieces of pure corundum.

1,225,801 A. HOUPEURT. L. ISSENMANN, INSTI-TUT FRANÇAIS DU PETROLE DES CARBURANTS ET LUBRIFIANTS DIS-POSITIF DE FORAGE. Drilling device.

1,226,006 H. G. VACCHELLI. Apparatus for counting horological stones and other parts of fine mechanisms.

1,226,835 R. C. STANHOPE, MICROMATIC HONE CORP. Abrasive elements.

GERMAN

Patentblatt 1960 Vol 80 (12-15) (Mar-Apr)

Applications Open to Public Inspection

1,078,471 R. SCHAAK. Honing machine.

1,078,478 P. HILLMANN, VEB FEINMESS DRES-DEN. Device for limiting the depth of penetration of a tool into a workpiece, in particular in engraving machines.

1,078,486 A. SCHOLZ. Porous ceramic abrasive body.

1,078,857 H. E. DE BRUYN, NV PHILIPS' GLOEIL-AMPENFABRIEKEN. Device for machin-ing a workpiece by means of an electrode piece by means of an electrode kept at a potential.

1,078,895 J. RINGS, W. FERD KLINGELNBERG SOEHNE. Device on machines for grinding helically fluted tools.

1,078,896 C. W. GEHRING. Honing tool for finishing very small bores.

1,078,897 FA FRIEDRICH NAGEL. Honing tool for the internal machining of bores of small diameter.

1,078,898 ARTHUR OFFEN DEVELOPMENTS LTD. Lapping machine.

1,079,243 P. BURO, PHILIPS PATENTVERWALT-UNG GmbH. Device for working by electro-erosion using several electrodes.

1,079,334 W. ECKERKUNST, VEB FEINMESSZEUG-FABRIK SUHL. Apparatus for testing the waviness of the ball tracks of ball bearing races.

1,079,425 W. THIEMIG, ZAHNRADFABRIK FRIED-RICHSHAFEN AG. Gear-profile grinding machine with rotating truing tools.

1,079,497 E. ROTZOLL, HERMINGHAUSEN-WERKE GmbH. Truing device for the control wheel of centreless circular grinding machines during continuous grinding.

1,079,500 K. F. HILZINGER, FA C. HILZINGER-THUM. Grinding wheel composed of abrasive lamellae.

1,079,799 A. KNAFF, SIEMENS-SCHUCKERT-WERKE AG. Cutting device for plate-glass produced as a continuous ribbon.

1,079,924 M. ELTRICH, ZAHNRADFABRIK FRIED-RICHSHAFEN AG. Device for the longitudinally convex grinding of gear wheels.

1,079,989 D. MUNZ, K. BERSTECHER. Artificial resin or ceramic bonded grinding body.

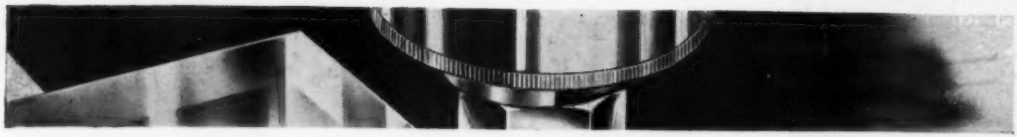
1,080,008 M. E. PHILIPPS jun, AMERICAN MACHINE & FOUNDRY CO. Method and device for cutting pieces of pre-determined length from a ribbon, in particular for manufacturing tipped cigarettes.

Patents Granted

973,664 F. HUELLENKREMER. Device for machin-ing drawing dies.

TRADE NAMES INDEX 1960

Readers of *Industrial Diamond Abstracts* will already be aware that the above publication is due to appear within the next couple of months. Owing to the heavy demand already evident, those wishing to obtain copies are requested to order them as soon as possible. Publication price has not yet been decided and money should not, therefore, be enclosed with orders. The price is not likely to exceed 5/-.



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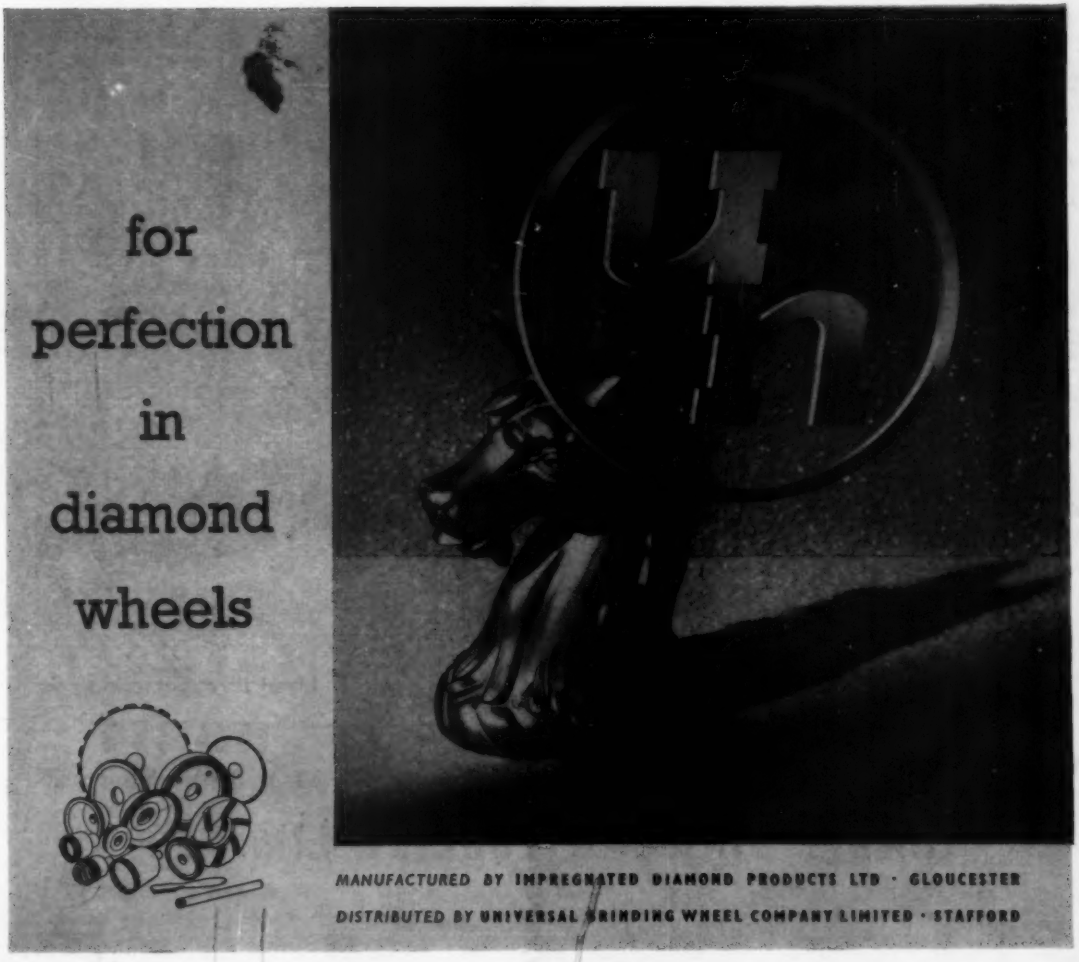
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